ENGINEERING AND MINING JOURNAL

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MAY 1953

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SOUTH AFRICAN URANIUM . . . P.72

These pumps sell themselves

Our sales records for 1952 show that of the hundreds of Hydroseal Pumps sold, 73% were bought by companies that already had Hydroseal experience. They didn't buy a "pump in a poke", but made their selection on the basis of substantial savings in other operations. Check through this list, and you'll see why Hydroseals are their own best salesmen.

EASY MAINTENANCE

All Maximix Rubber Parts are moulded to shape and are mechanically locked into proper position without cementing or vulcanizing. Your own men can make repairs quickly in the field.

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Hydroseals will operate efficiently under both high inlet pressures and high suction lifts.

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HIGH EFFICIENCY

Clear sealing water protects close clearances from abrasive wear. Initial high efficiencies are maintained throughout pump life. No adjustments, take-up, speed changes, etc., are needed.

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Maximix Rubber Parts cost less than equivalent metal parts, are 80% lighter, and thus easier to handle and cheaper to ship.

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4. High quality seals prevent the loss of grease and the entrance of dirt from all gearing.
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6. Each drum is equipped with rope guides to prevent excessive wear on the wire rope, individual finger tip clutch control, and external easily accessible clutch adjusting screw.

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B. F. Goodrich grommet belts last 20 to 50% longer, yet cost no more than ordinary V belts

Save 3 ways

Here's how you can make a 3-way saving with B. F. Goodrich grommet V belts. First, you save on replacement costs because grommet V-belts last 20 to 50% longer. You save on production costs because machines keep running with fewer interruptions. And you save on maintenance costs because these V belts need less attention. Here are the basic reasons BFG grommet belts outlast and outperform ordinary V belts:

Strongest V belt made

All of the load-carrying cords in grommet belts are concentrated in twin grommets. These grommets are cord loops, made like giant twisted cables except that they're endless. Since there are no center cords, the grommet belt is more flexible, and so can "give" temporarily and absorb shock loads. As a result, grommet belts last 20 to 50% longer, depending on the service. (The more severe the service, the greater the increase over ordinary belts.)

No weak spots

The section where cords overlap is the weak spot in ordinary belts. That's where 80% of V belt failures occur. But in grommet V belts this cause of belt failure has been eliminated. The grommets are endless. There are no splices or overlaps—no weak spots to cause premature belt failures.

⅓ more grip

Grommet V belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip sheaves better. Size for size, grommet belts give ⅓ more gripping power with less slip, pull heavier loads with a higher safety factor. And because there is less slip, there is also less surface wear.

Less stretch

In ordinary belts under tension, the center cords loaf, the outer cords overwork because tension is greater near the driving faces. Grommet belts, with no center cords, have much more strength and less stretch. Grommet belts stretch, on an average, only about ⅓ as much as ordinary belts.

They cost no more

Grommet V belts were developed by B. F. Goodrich to give V belt users more for their money. No other belt will stand so much punishment or last so long. Yet the savings they can make for you will be clear profit because grommet belts cost not one cent more than ordinary V belts.

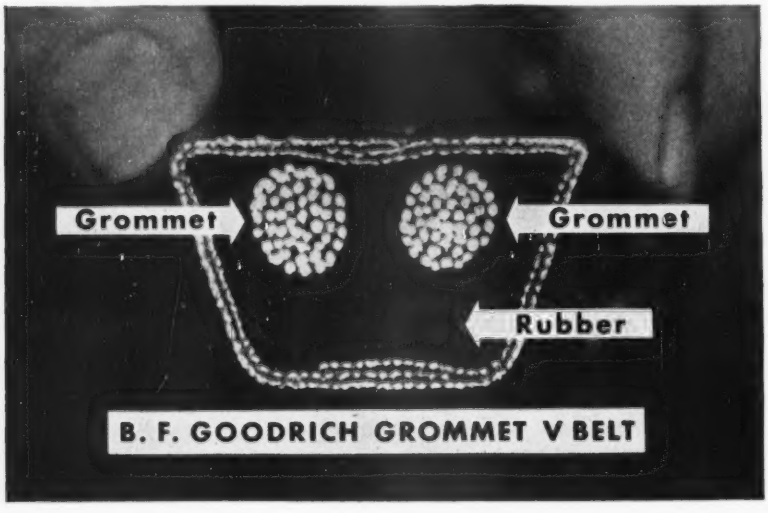
Send for proof today

Ask your local B. F. Goodrich distributor or send the coupon for a set of reports telling users' experiences and showing actual installations where grommet V belts have outlasted all others.

Grommet V-Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY



The B. F. Goodrich Company
Dept. M-29
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt so I can see grommet belt construction.

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87TH YEAR OF PUBLICATION

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EASY DOES IT

. . . when you're starting cars lubricated with TEXACO OLYMPIAN GREASE

SUMMER, winter — any time of year — mine cars lubricated with *Texaco Olympian Grease* start easier and run smoother. That's because *Texaco Olympian Grease stays in the bearings* — plain, cavity hub or anti-friction. You get longer lasting protection against dirt, moisture and wear.

Texaco Olympian Grease effectively resists oxidation, and will not separate in use or in storage. The extra protection it gives means extra life for your bearings and lower maintenance costs for you. There are three consistencies to meet every requirement. All are easy to apply.

On wire rope and open gears, use *Texaco Crater*. It keeps rope strong longer because it penetrates — surrounding the core and strands with a long-lasting protective film. On gears, it clings to the teeth, reduces wear and muffles noise. For extra convenience in application, use *Texaco Crater X Fluid*. It *goes* on as a liquid, *stays* on as a tough, persistent lubricating film.

Call in a Texaco Lubrication Engineer and let him help you increase efficiency and reduce costs through effective lubrication. Just contact the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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Tuesday nights
On television —
the TEXACO STAR THEATER
starring MILTON BERLE.

See newspaper for time and station.

TEXACO

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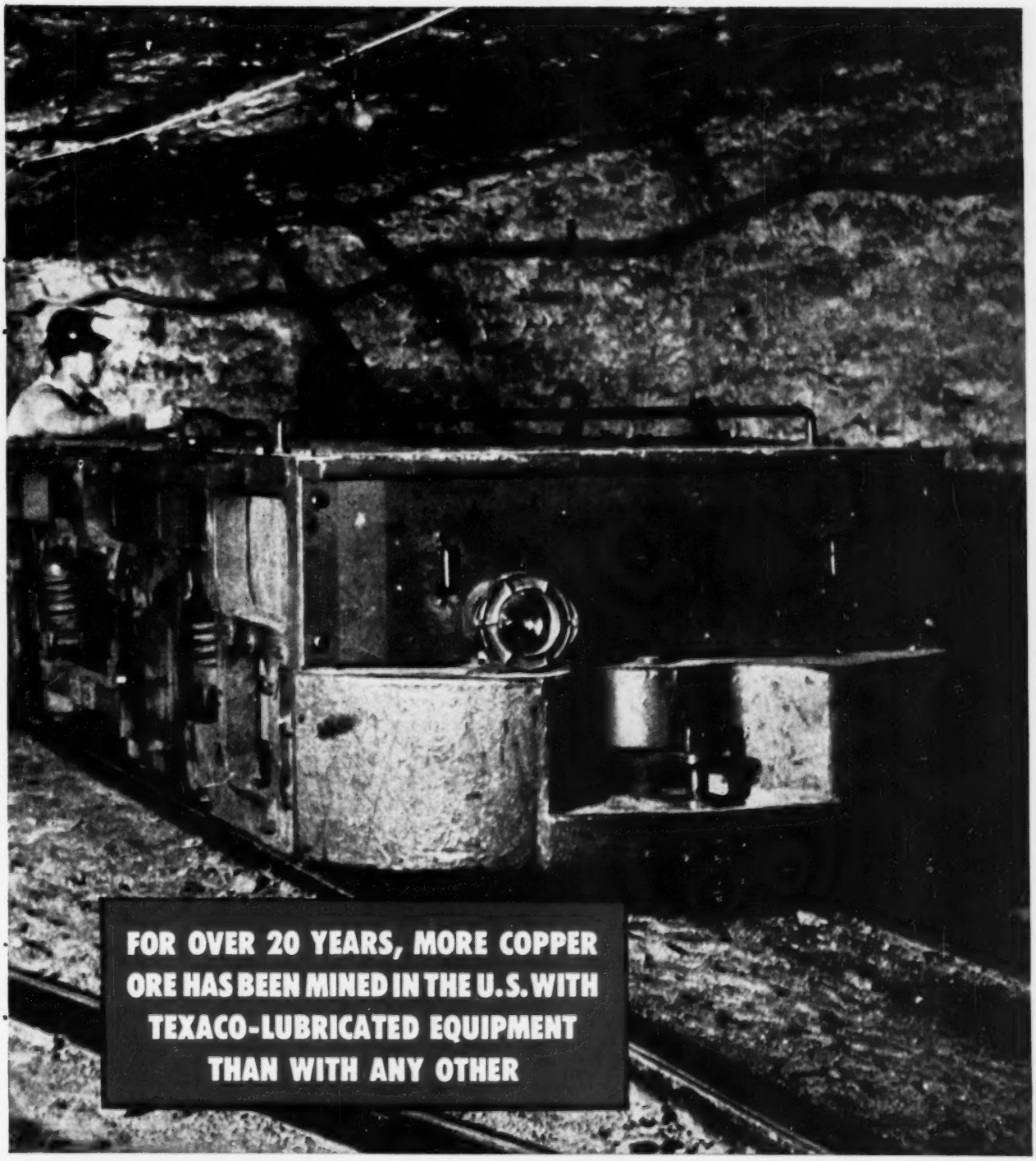


Lubricants and Fuels

FOR THE MINING INDUSTRY

9% MORE OUTPUT

By saving 15 to 25 seconds every time it dumps, Koehring heavy-duty Dumptor earns an important increase in yards hauled per hour. For example: At 16 trips an hour on a typical 1000-foot one way haul, saving an average of 20 seconds every cycle gives you 5.3 minutes more productive haul-time . . . and adds 9% to hourly yardage output.

There is no waiting for slow-acting body hoists. With Koehring gravity dump it takes just one second to dump a full 6-yard load. Operator trips the body release lever, and gravity instantly tilts the scoop-shaped body 70° . . . one second later the body is empty, and Dumptor is on its way back for another load.

You get this same one-second dumping even in sub-zero weather because gravity dump never balks . . . never wears out. And you don't lose time or spend money on expensive hoist maintenance or costly replacement parts because Koehring Dumptors have no body hoists.

One-second gravity dump and no body hoist maintenance are typical of Koehring Dumptor's basic principle . . . to reduce all non-productive time and costs to the absolute minimum . . . and to increase work-time for more yards per hour, more profit per yard for you.

Dumptor has many other cost-cutting advantages worth checking . . . it will pay you to get all the details from your Koehring distributor, or write to us for 28-page Dumptor catalog.

KOEHRING COMPANY • Milwaukee 16, Wis.

Subsidiaries: KWIK-MIX • PARSONS • JOHNSON

FAST CLEANING scoop-shaped body has all-welded sides, ends and bottom heavily reinforced with 4" channel ribs for toughest rock service. Triple strength is built into steel-oak-steel bottom . . . free-swinging kick-out pan adds another steel layer.

NO-TURN SHUTTLE HAUL is another production-boosting Dumptor advantage. Heavy-duty constant-mesh transmission gives the same 3 fast speeds forward and reverse . . . saves turning at the loading unit, on the haul, at the dump . . . speeds cycles.

with 1-second gravity dump

K231

KOEHRING DUMPTOR®

KOEHRING HEAVY DUTY

EXCAVATORS . . . ½ TO 2½ YARDS

CRANES . . . 7¾ TO 79½ TONS LIFT CAPACITIES

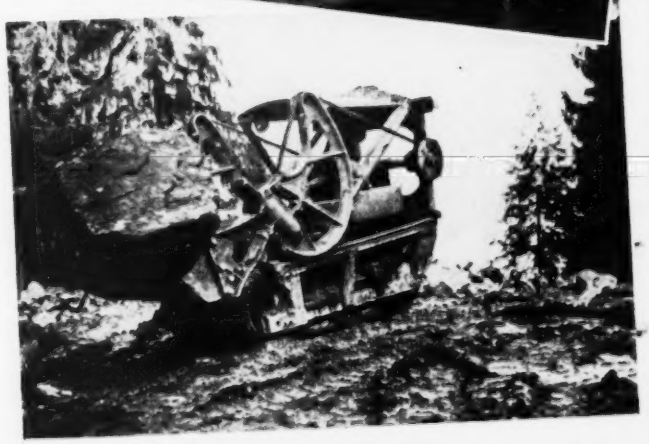
Eimcos moving earth for fill to build major link in Pan American highway in South America.

MOVING MATERIAL *Fast*

Building levees, highways, for bulldozing, clearing boulders from highways — any job that requires low cost earth or rock moving is best done with Eimcos.

These rugged, heavy-duty loading machines are finding their place in state highway departments, county and municipal road jobs, in sand and gravel pits, in steel mills and among contractors on heavy construction and airport jobs.

Investigate the cost of handling material the Eimco way before you buy.



Above: As a bulldozer. Below: Road building job in Austrian Alps. The shape of the Eimco bucket and the rocker-arm digging action make it possible to pick up and move pieces much larger than with other equipment.

EIMCO A469

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES · SALT LAKE CITY 10, UTAH, U. S. A.

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You can't beat an Eimco

When loading in a pitching vein the Eimco centers as it clears the muck pile — cleans up easily under the hanging wall.

CONSISTENT LOADING

"Our Eimco turns in a consistently good loading job," says one operator. "You can always depend on it although it requires only a minimum of attention and practically no maintenance."

Eimco's are heavy-duty machines with gear trains running in oil completely sealed in their heavy alloy-steel cases. Easy to operate, it has wide clean-up with automatic centering to load cars full all the way back.

For rock loading there is no equal to Eimco performance, dependability and economy.

Write for more information on the Eimco best suited to your job.

EIMCO 1448

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

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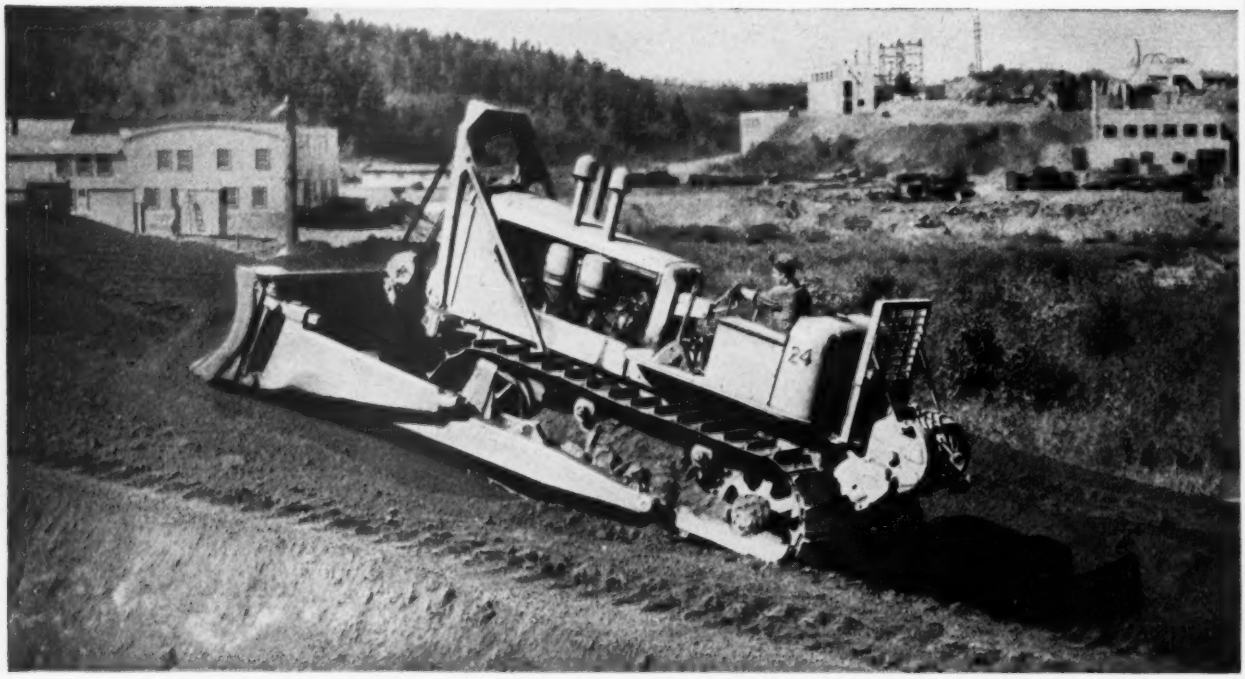
You can't beat an Eimco

NEW TRENDS IN MINING MECHANIZATION



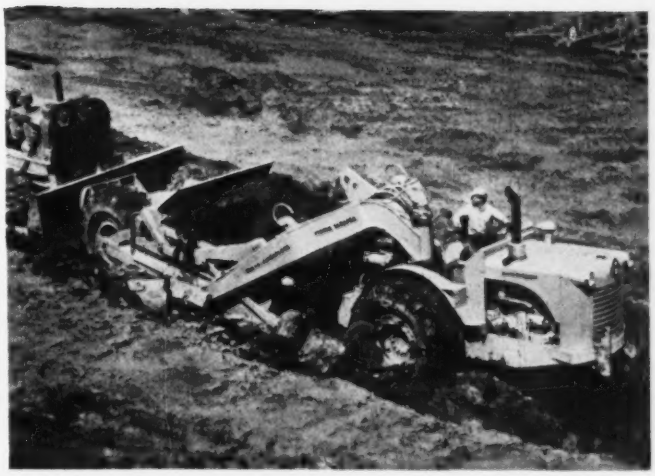
Stockpiles processed ore. HD-20 Tractor also builds access roads . . . maintains tailings dumps . . . cleans up around shovels . . . cuts drainage ditches . . . digs sludge basins and sluice-ways . . . builds reservoirs and pond dams . . . clears and levels building sites . . . tows equipment.

Loads ore underground. HD-5G Tractor Shovel also loads sand and gravel, other bulk materials . . . cleans up around conveyors and hoppers. Special materials buckets, bulldozer blades, other attachments available. Tractor shovels available for all sizes of Allis-Chalmers crawler tractors.

Builds and maintains haul roads. AD-40 Motor Grader levels pit bottoms . . . digs and grades for drainage . . . scarifies . . . prepares dragline sites. Gasoline-powered Model D Grader also available. Handles routine road maintenance — light construction, etc.

TODAY'S demands on mining production require the selection of equipment of the broadest versatility. Allis-Chalmers offers a complete range of material moving and handling equipment — including four sizes of diesel crawler tractors, motor graders, pull scrapers, high-speed Motor Scrapers and Motor Wagons — designed to fit your particular mining applications and to deliver the highest possible output.

Here are some on-the-job views with a few of the many ways in which these modern machines are speeding production and lowering costs.



Strips overburden. 13-yard heaped capacity TS-200 Motor Scraper also loads, hauls material from open pit . . . clears and levels for camp sites and drill setups . . . levels and grades building sites . . . hauls in supplies. Larger 18-yard heaped capacity TS-300 also available.

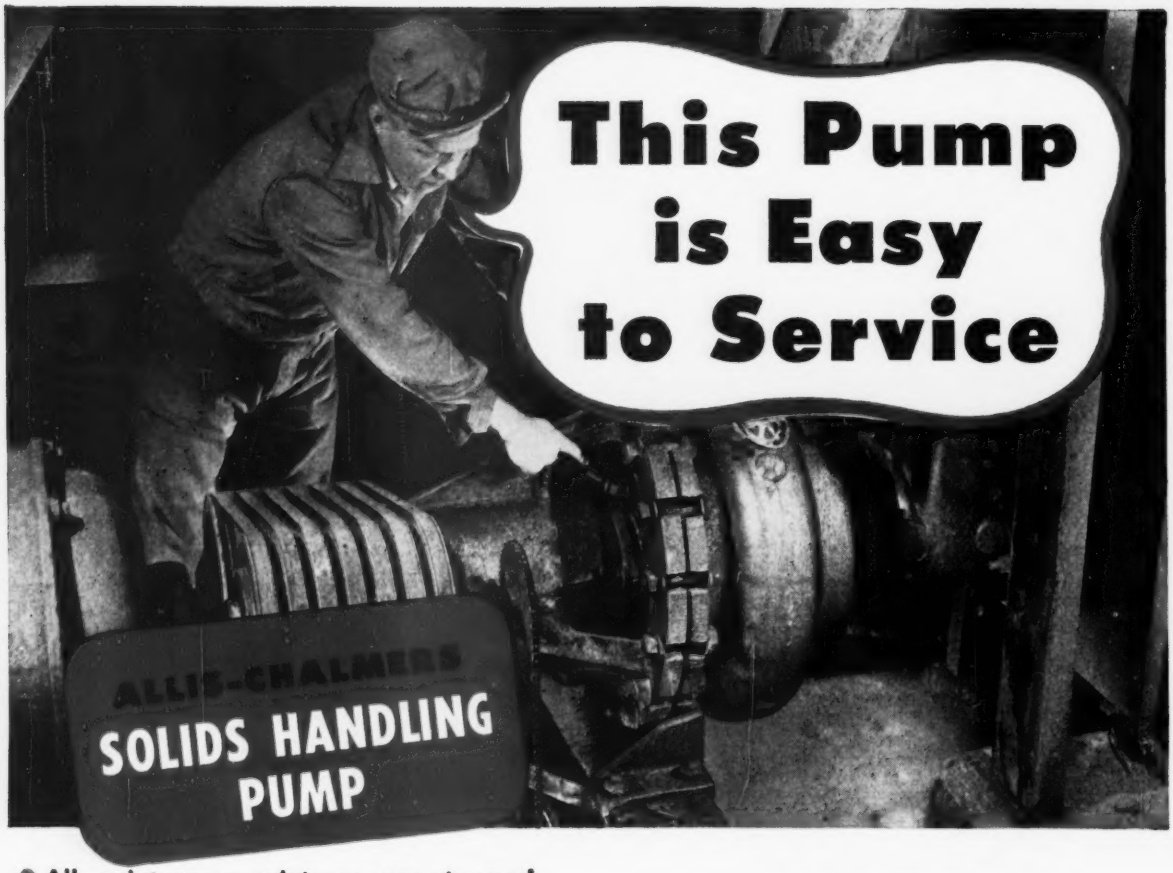
Hauls rock overburden. TR-200 Motor Wagon hauls tailings, sand, gravel, silicon, lead and zinc ore. Unit travels fast "off-road" with capacity loads . . . dumps clean every time with 18-ton, hydraulic-controlled rear-dump body. Sides channel-ribbed for rigidity.

Levels tailings dump. HD-20 Tractor with pull-type scraper also loads and hauls ore-bearing material — handles large-scale stripping jobs. Exclusive Allis-Chalmers hydraulic torque converter on HD-20 gives higher output, less upkeep on pulling, pushing and dozing work.

Complete line of pull-type scrapers available, from 2-yard to 18-yard sizes.

Your Allis-Chalmers dealer will be glad to analyze your equipment needs and help you select the right machines for your jobs. See or phone him soon to watch these machines in action.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



- **All maintenance points are easy to reach.**
- **Can be taken down and returned to service in less than a half hour.**
- **Many parts interchangeable between different pump sizes.**

Here's a pump that maintenance men like. The Allis-Chalmers solids handling pump is solidly built to stand rough solids handling service. And it's easy to work on. Notice how accessible the packing gland is. See how the casing bolts are arranged. Just loosen the nuts a couple of turns and the bolts lift out.

Wearing parts separate into easily handled units. In fact, one man can tear down an Allis-Chalmers solids handling pump, replace a part and have it back in action again *in less than a half hour*. Piping need not be disturbed unless the casing is replaced.

COMPLETE PUMPING UNIT FURNISHED

This pump is equipped with *Texrope* V-belt drive and *Vari-Pitch* sheaves. Head and capacity can be varied instantly by the turn of a crank. Allis-Chalmers can furnish the complete pumping unit — pump, motor, control and drive — assembled and ready to run.

GET THE COMPLETE STORY

Every Allis-Chalmers solids handling pump is application-engineered by a specialist who knows solids handling equipment problems and how to solve them. Your nearby Allis-Chalmers representative will be glad to give you complete facts and figures on CW pump performance. Or write Allis-Chalmers, Milwaukee, 1, Wisconsin and ask for Bulletin 52B6381. A-3975

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

NOW

...even longer wear

Impeller and suction wear plate now made of *Ni-Hard* alloy at no extra cost. You get longer wear . . . lower pumping costs.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

HERE are two Northwests working way up above timber line on the backbone of the Rockies. They are doing a job for C. Ryan & Son at Climax, Colo. These two Northwests are working at 11,680 ft. above sea level—over two miles high! High output tells the story of a properly engineered power plant for altitude plus the Northwest Dual Independent Crowd that makes use of power many shovels waste entirely. Here is a combination that only a Northwest can give you—a combination that assures the profitable answer to mountain problems just as at normal altitudes. It is just another of the many things that make the Northwest a line of real Rock Shovels. If you want to get the job done and be ready for *all* the problems that every job presents, a Northwest is the answer.

NORTHWEST ENGINEERING COMPANY
1509 Field Bldg., 135 South LaSalle St., Chicago 3, Ill.

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

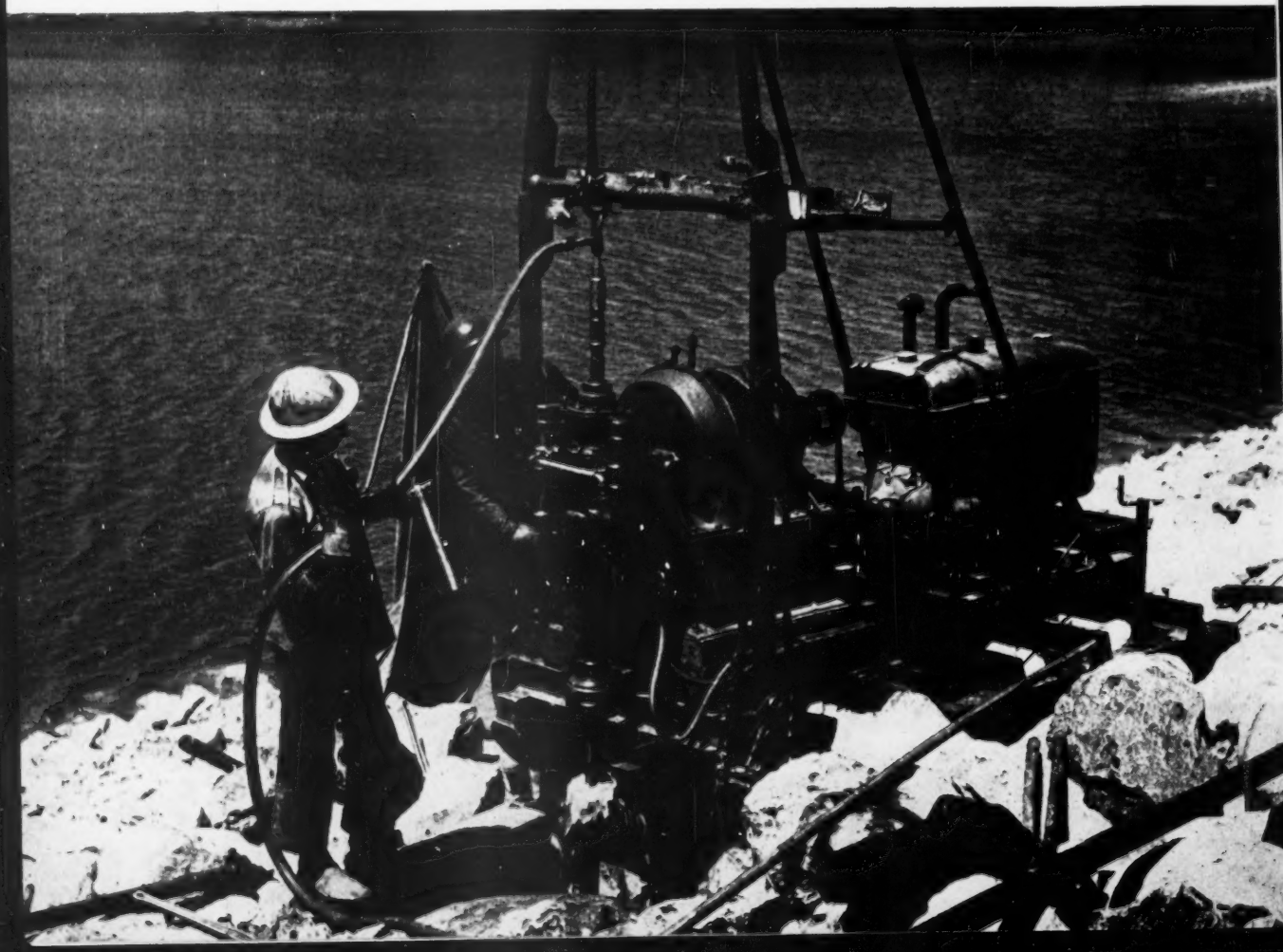
Naturally you want

TRUE CORES

. . . and you want them **FAST**

and at **LOWEST COST**

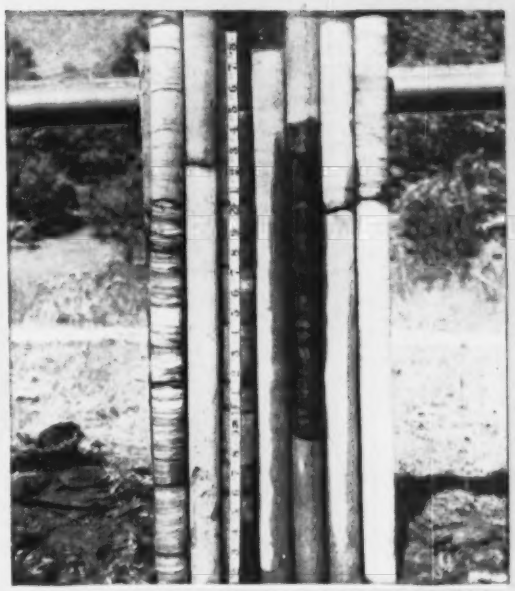
SO . . . **WHY NOT BET ON A SURE THING .**



On the strength of the story told by these cores, a new mine was opened and became a big producer. With a Joy Diamond Core Drill, it was a simple matter to analyze and measure these cores and determine, precisely, the mineral content, size and value of the deposit.

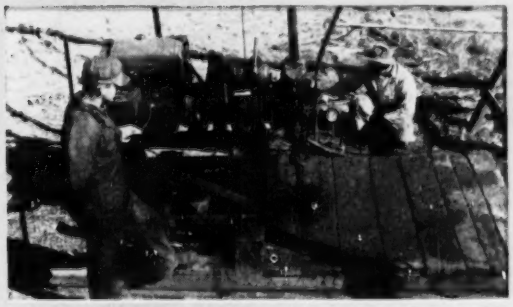
Prospecting can be done at a fraction of the cost and in much less time than any other method. There are many other uses for Joy Diamond Core Drills, too. They're great for blocking out ore bodies, testing sub-surface foundations and completed structures, and drilling holes for pressure grouting, underground drainage, ventilation and gas relief.

For full details on Joy Diamond Core Drills, write for bulletins to **Joy Manufacturing Company, Oliver building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



USE JOY DIAMOND CORE DRILLING EQUIPMENT

THE JOY 22-HD is a heavy-duty drill that's rugged, portable and versatile. It's direct-driven with four-speed transmission—either hydraulic or screw-feed swivelhead. An easily-operated, rugged, but sensitive hoist that handles strings of drill pipe up to 2000 feet and operates at hoisting speeds up to 290 feet per minute. Details in Bulletin D-28.



THE JOY 12-B is a highly efficient drill that can be quickly dismantled into four compact units for convenient transportation. With a capacity of 1000 feet, its versatility and portability make it ideal for the other duties required of a sturdy drill. Available on skid or column mounting for surface or underground operation. Skid mounted model uses either hydraulic or screw-feed swivelhead. Details in Bulletin D-21.

CORE DRILLING BY CONTRACT

Complete core drill contracting service by highly skilled crews is available for mineral prospecting, blocking out ore bodies, testing foundations, drilling grout holes, etc. Write for full details.

TRUCO AND JOY-TRUCO DIAMOND BITS AND REAMER SHELLS

Sales and Resetting Service throughout the World by Joy Manufacturing Company

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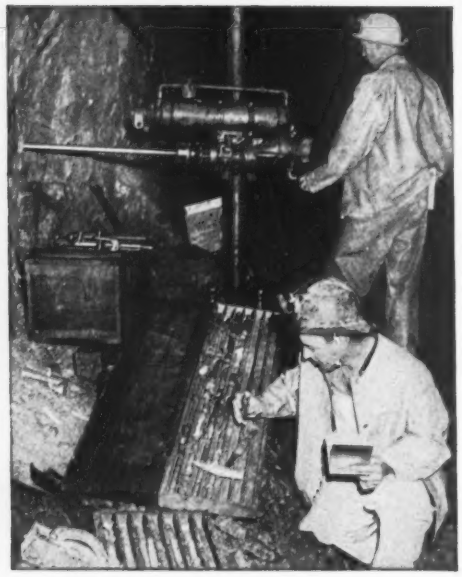
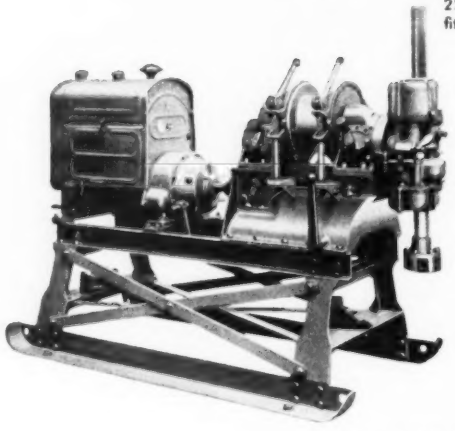
WORLD'S LARGEST BUILDER OF CORE DRILLS, ROTARY BLAST HOLE DRILLS AND MOTORIZED DRILL RIGS



FOR BLAST HOLE AND EXPLORATORY DRILLING

CP-15 Diamond Core Drill — capacities to 2250 ft. with E-EX fittings.



CP-8 Diamond Core Drill — capacities to 1250 ft. with E-EX fittings.

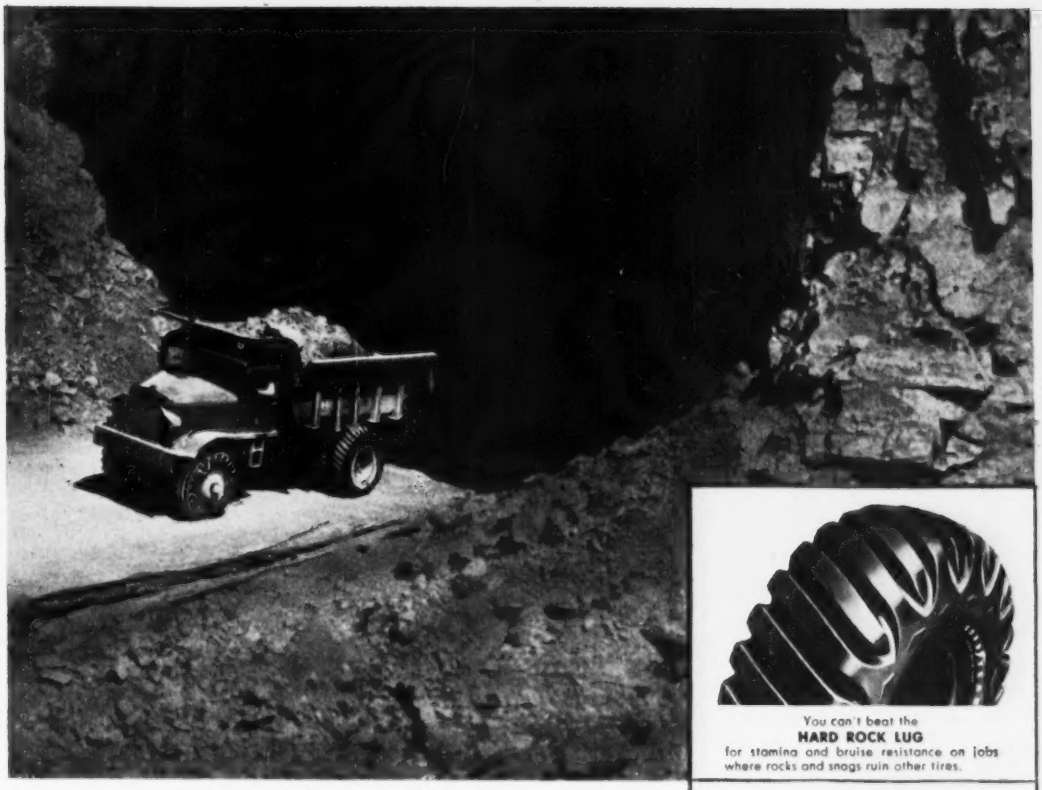
The CP-55 Diamond Drill – Equally efficient for blast hole and exploratory drilling. Faster than any other drill in its class, the CP-55 is powerful yet light-in-weight . . . has a CP Rotary Air Motor that requires minimum air per foot drilled. Delicate bit control affords high core recovery and reduces bit replacement costs. Self-aligning rod puller for holes deeper than 100 feet. Conservatively rated at 500 feet with E Rods and EX Fittings.

Designed for mineral prospecting and locating extensions of existing deposits, the skid mounted CP-8 and 15 Diamond Core Drills are engineered to withstand the continued high drilling speeds made possible by Bortz bits. They're available with gas, diesel or electric drive for surface drilling and air drive for underground use. Bolted frame construction permits disassembly for transporting to remote sites. Both models are also available with hydraulic or screw feed swivel head. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

THERE GO YOUR PROFITS-



You can't beat the
HARD ROCK LUG
for stamina and bruise resistance on jobs where rocks and snags ruin other tires.

You can't beat the
HARD ROCK RIB
for front wheels on all tire-killing service. Rugged—smooth rolling—easy steering.

You can't beat the
ROAD LUG
for toughness and traction OFF the road and long, smooth mileage ON the road.

AND WHETHER THEY GO into your pocket or out the window can well be decided by how your tires *work* and *stand up* under any and all conditions.

It takes loads of experience to build tires that can handle *any* job, day in, day out—and save you time and money—but Goodyear has what it takes. Goodyear has built over 580 MILLION pneumatic vehicle tires—more tires for more uses than anyone else on earth—and out of that unmatched practical experience come the continuous cost-saving improvements that mean so much to you. So pin your faith on Goodyear tires for every wheel on the job—and see what your equipment can really do!

Goodyear, Truck Tire Department, Akron 16, Ohio.

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!

America Needs Better, Safer Roads — Let's Bring Them Up to PAR

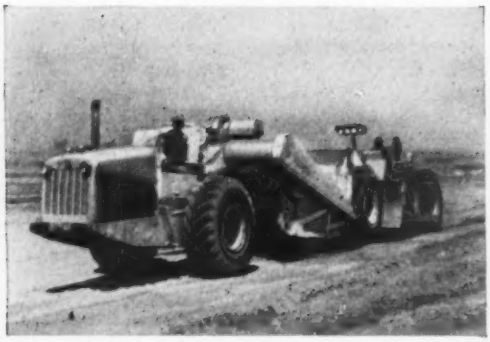
GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND

Road Log—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

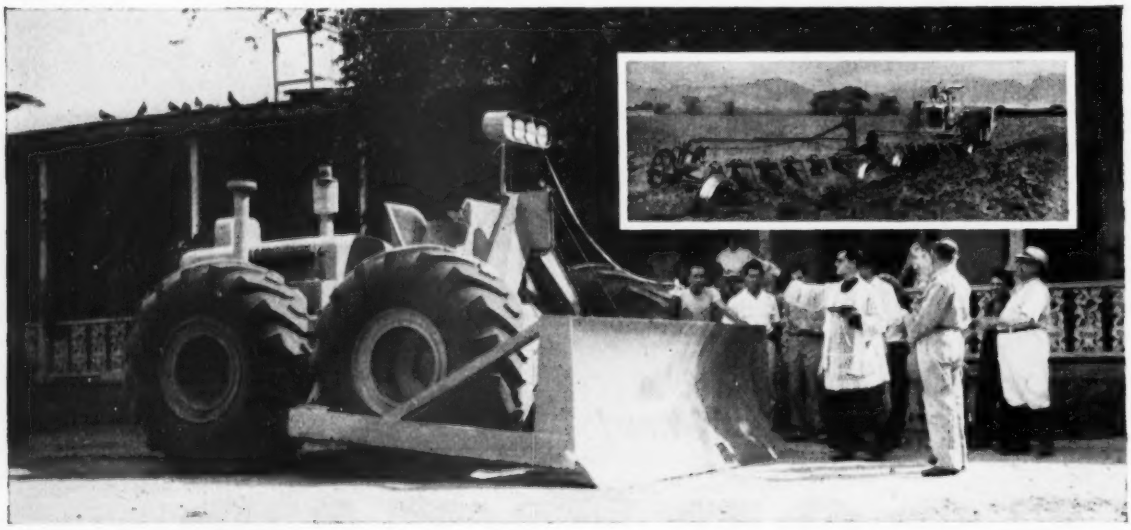
LeTourneau pictures of the month . . .



DIAMOND MINER — Near Kasai, Belgian Congo, 9 C Tournapulls and 5 Tournatractors are stripping 7,850,000 cu yds of overburden to uncover industrial diamond deposits. Push-loaded by a 186 hp Tournatractor, each Tournapull removes 6 to 7½ loads (59 to 73 pay yds) of clayey sand hourly on a 1-mile cycle.

5 JOBS DAILY — "Tournatractor does the work of 2 crawlers," reports Plant Supt of an Arkansas bauxite mine. Speedy rig cleans around two 2½-yd shovels . . . dozes ore into 8 grizzlies . . . maintains rock stockpile. Rig also pulls "gyp" wagon to dump . . . spreads waste material — does all these jobs in a 12-hr shift.

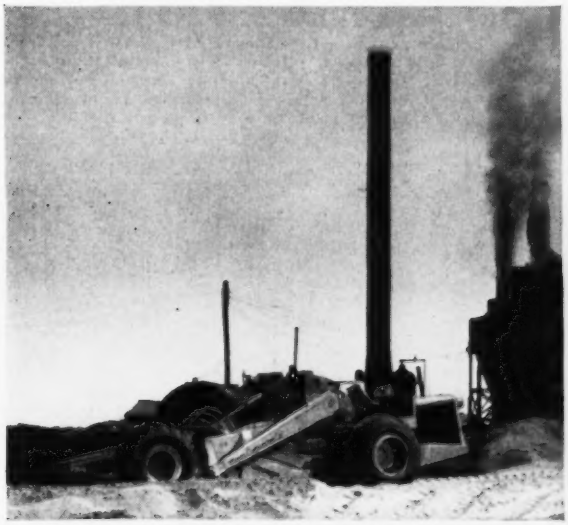
40% LOWER COSTS — No, these rocks weren't "frozen" into the Tournarocker. High-speed photography makes them look like it, but actually dump took only 5 to 10 seconds on this W. Va. rock job. Owner C. E. Wetherall also reported his D Tournarockers gave 40% lower hauling costs than trucks. Output for his two 9-ton Tournarockers on typical 1400-ft cycles: 144 pay yds of shovel-loaded rock hourly.



DOUBLE BLESSING — In ceremony, traditional all over South America, padre blesses new Tournatractor. Hacienda Pata-Poo, Peru owner of the unit, has received a blessing, too. Their 19 mph Tournatractor, pulling 2 gang disks, deep-plows 2½ acres hourly — twice crawler output. Tournatractor also pulls 24-in. ripper for sub-soiling. This tool digs 20 in. deep into hard clay, brings up sub-surface water unobtainable with other methods. Explains Plantation Manager de Miguel, "The extra water makes our cane grow healthier, weigh more, and increases sugar content — thus producing more sugar and more profits."

performance reports from around the world

BAGDAD HAULER —This 40-ton Tournarocker is one of Bagdad Copper Corp's haul units. The company, which mines copper at Bagdad, Ariz, also owns a 50-ton Tournarocker. Cycle of 4500 ft takes the 40-ton 'Rockers 11.2 min, despite 650 ft of 10% adverse grade and narrow haul roads. Cycle time includes 2 min to load from a 4-yd shovel, and ½ min to spot and dump. Disc-type 4-wheel air brakes let operator haul in 3rd gear along the narrow benches with complete confidence and safety.



100 YDS PER HR WINS JOB— On competitive demonstration at a Greenville (N.C.) asphalt plant, this D Tournapull stockpiled 20 loads of sand hourly. Each of two 91 hp crawlers, working same 450 ft haul, brought in only 6 loads hourly. All rigs self-loaded 5 bank yds per load. Based on results, Company President A. J. White bought the Tournapull.

22% MORE COAL —Stockpiling coal for a power station in Rhode Island, Tournatractor dozed 16,850 cu ft (420 tons) of coal in 2 hrs . . . outproduced a crawler-tractor working under identical conditions by 77 tons (or 22%). Coal was moved 190 ft down a gradual slope, then over a steep 25-ft bank.

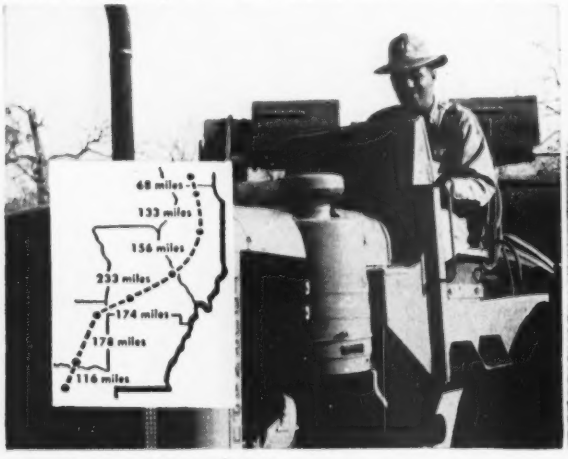
Cont'd on next page

LeTourneau pictures of the month (cont'd.) . . .

336 HR JOB IN 12 HRS—When a last-minute telescope breakdown threatened success of the US Navy and National Geographic Society's Solar Eclipse expedition to Khartoum, the Anglo-Egyptian Sudan Government came to the rescue. Its versatile 15-ton Tournacrane carefully hoisted and positioned the delicate 2-ton dish-assembly. The job, which would have taken about 336 man-hrs if done by hand, took only 12 man-hrs with the Tournacrane. Instead of missing the Eclipse they had traveled 7000 miles to see, astronomers not only saw the entire event, but had plenty of time to test and re-adjust settings.

"TOUGHEST TUNNEL"—Halfway into a 3226-ft tunnel for B & O RR, Chicago Contractors Bates & Rogers struck an abandoned coal mine that made their routine job "one of the toughest RR tunnels ever built." Ten-yd Tournarockers, with 12¾-ft turn radius, were only haulers that could turn non-stop in the 31-ft passage. Trucks had to be turned on a skid plate.

OUTLASTS TRACKS, 4 TO 1 — This material may look like powder, but it's abrasive sand. It wears out crawler tracks in 4 to 6 months, yet C. E. Ulery, president of Asphalt Paving Inc., Jacksonville, Fla., estimates tires will last at least 2 to 3 years. Despite 100 lbs rolling resistance, Tournapull moved 9 loads (55 pay yds) hourly on 2700 ft cycles.

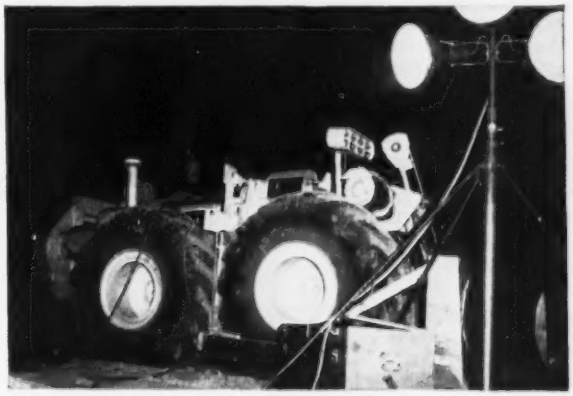


1058 MI FOR $60 — In a move which dramatically illustrated the roadability of a D Tournapull, Bill Kastner traveled 1058 miles from his home in Madison, Wis, to Arlington, Texas. It was D Tournapull's longest solo highway trip of the year. He started at 2 pm Jan 3 at Madison. By 6 pm that day, he had arrived at Rockford, Ill . . . 68 mi in 4 hrs. The second day he ran into a blizzard and made only 133 mi to Bloomington, Ill. His next stop, on Jan 5, was St. Louis, 156 mi further. On Jan 6 he drove 233 mi to Springfield, Mo . . . Jan 7, 174 mi to Pryor, Okla . . . Jan 8, 178 mi to Durant, Okla. At 1:30 pm Jan 9, Kastner arrived in Arlington, Tex. In 6 days, he had driven 1,058 mi (all by daylight) . . . used 180 gals of fuel . . . average, 5.9 mi per gal. Total expenditure for fuel, lodging and food: $59.98. Saving over rail freight: $450.

performance reports from around the world

8 JOBS FOR JOHNS-MANVILLE — Even though the temperature often reaches 50° below zero, Canadian Johns-Manville works their Tournatractor 24 hrs a day, 6 days a week at their asbestos pit near Matheson, Ontario. One winter month, rig put 535 hrs in on 8 scattered jobs (other hrs went for job-to-job travel, lubrication, etc.). Of total time, unit spent 238 hrs dozing ore to crusher, cleaning around 4 shovels, and maintaining ore stockpile. Another 87 hrs went into tailings-dump maintenance. 62 hrs into waste-dump maintenance. Tournatractor worked 43 hrs towing compressors, wagon-drills, and other mine equipment. For 62 hrs, it plowed snow — in one typical 6¾-hr period, traveling 30 mi and opening 26 mi of road. For 43 hrs, it did such odd jobs as clearing rock and clay overburden, and helping shovels up steep grades. Its mechanical efficiency: 95%.

GOOD AS 4 MACHINES — "My D Roadster has replaced 3 trucks and one ¾-yard shovel on this job, and eliminated the wages of 3 hired men," says Sam Coffman of the Bowie Sand and Gravel Co. in Texas. His "D" strips the pit . . . selectively self-loads sand and gravel . . . stockpiles materials.

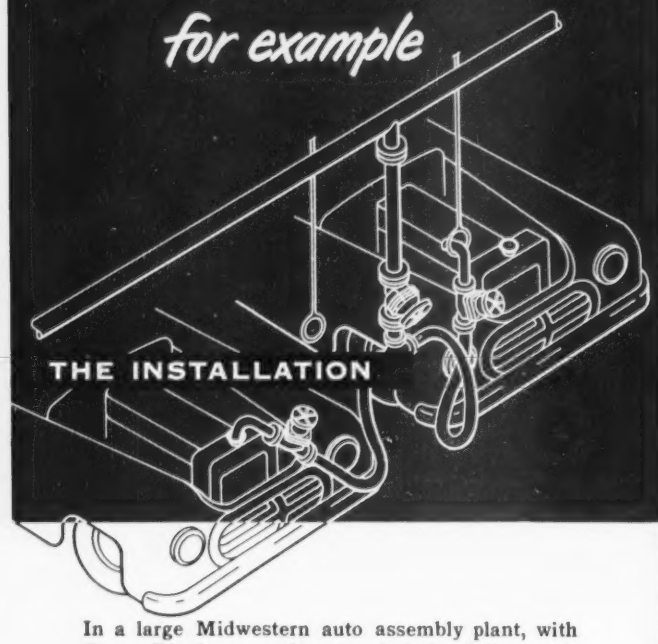


EMERGENCY GENERATOR — Another use for Tournatractor — as a portable generator for operating lights and power tools. For further information on any machine shown here, write to R. G. LeTOURNEAU, INC., Peoria, Ill.

LETOURNEAU LET EQUIPMENT

Tournapull, Tournarocker, Tournacrane, Carryall—Trademark Reg. U. S. Pat. Off. Tournatractor—Trademark Pic. 397-M

How Valve Life Changed from Days to Months ...on Crystalline Liquids, for example



In a large Midwestern auto assembly plant, with Crane Diaphragm valves in alcohol solution anti-freeze fill lines to automobile radiators.

VALVE SERVICE RATINGS

SUITABILITY:	Doing the job O.K.
FEATURES:	Packless; no leakage around stem
MAINTENANCE COST:	None
SERVICE LIFE:	Now 25 times longer than any valve used
OPERATING RESULTS:	Damage to production stopped
PRICE:	O.K. no premium
AVAILABILITY:	Regular Crane Catalog item. No. 1610

THE CASE HISTORY

None of the many conventional valves nor the plug cocks tried in this service lasted more than a week—about 2,000 operations.

The crystals present in anti-freeze would build up on seating surfaces and in the exposed valve stem threads. The valves leaked and were hard to operate. To the excessive maintenance needed was added the high cost of frequent damage to automobile finish by anti-freeze leakage.

Now Crane Packless Diaphragm valves control the trouble. Their sealed bonnet prevents contact of fluid and working parts; their seating design isn't hindered by crystal deposits. At last report, Crane valves have given over 50,000 trouble-free operations with no maintenance, and with indefinitely longer life assured.

THE VALVE

In Crane Diaphragm valves, the diaphragm serves only to seal the bonnet, not for seating. It isn't pinched or stressed when valve is closed. Independent disc gives control of fluid even should diaphragm fail. These valves are made in a wide variety of body, diaphragm, disc-insert, and body-lining materials to handle countless corrosive, abrasive, or ordinary services. See your Crane Catalog or local Crane Representative.

THE BETTER QUALITY...BIGGER VALUE LINE...IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

ROCK RATED

with Built-In features to save you money

MODEL 1055 — 3½ yards
MODEL 955A — 2½ yards

Strength was no afterthought on this husky machine. It started on the drawing boards — with all-welded construction of tough rolled steels — with extra strength where strength is needed — with the ability to absorb continuous shock loads . . . and the stability to let you use full power for bigger production. It is the steady digging, without time-outs for pampering, that saves you money.

Add smooth hydraulic control to cushion operations and reduce operating fatigue, and you have the built-in advantages to make all kinds of rock work more profitable. The Model 1055 (3½ yard) and the Model 955-A (2½ yard) have proved it. Ask to see one on the job.

P&H MAGNETORQUE*

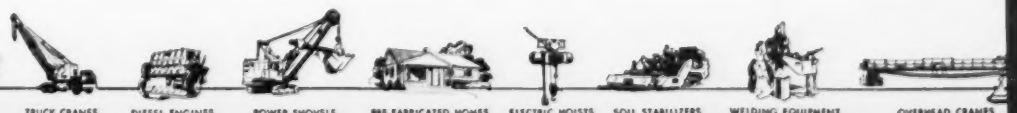
ELECTRIC SWING

gives you the slickest, fastest cycle you've ever known on machines of this size . . . from 15% to 25% faster than any others! And there are no delays for adjustments or replacement of swing frictions. Magnetorque eliminates all that — and lasts the life of your machine.

**T.M. of Harnischfeger Corporation for electro-magnetic type coupling.*

P&H LARGE EXCAVATOR DIVISION
HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN

the P&H *Line*



TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PRE-FABRICATED HOMES · ELECTRIC HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

Allison Torqmatic Drives

The Team that stretches time between overhauls!

Operators of heavy-duty, off-highway trucks soon find in their cost records that Allison TORQMATIC Converters and TORQMATIC Transmissions extend time between overhauls and help cut repair bills amazingly.

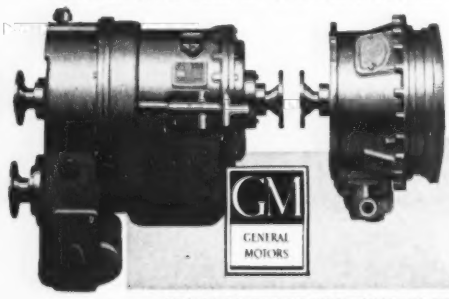
Allison TORQMATIC DRIVES match the engine power to the loads. Maximum engine horsepower can be utilized throughout the entire haul cycle, thus eliminating harmful shocks, lugging and stalling.

TORQMATIC DRIVES also cut operating costs because they take out much of the human element in driving the vehicles—gearshift guess and gearbox clash are things of the past. Allison TORQMATIC DRIVES "quick shift" hydraulically at full throttle by a flick of a simple control lever.

Send for the Allison pamphlet completely describing these Drives and learn more about their broad application to heavy-duty equipment.

ALLISON DIVISION OF GENERAL MOTORS
Box 894MM, Indianapolis 6, Indiana

MATCHED UNITS BUILT BY ONE MANUFACTURER



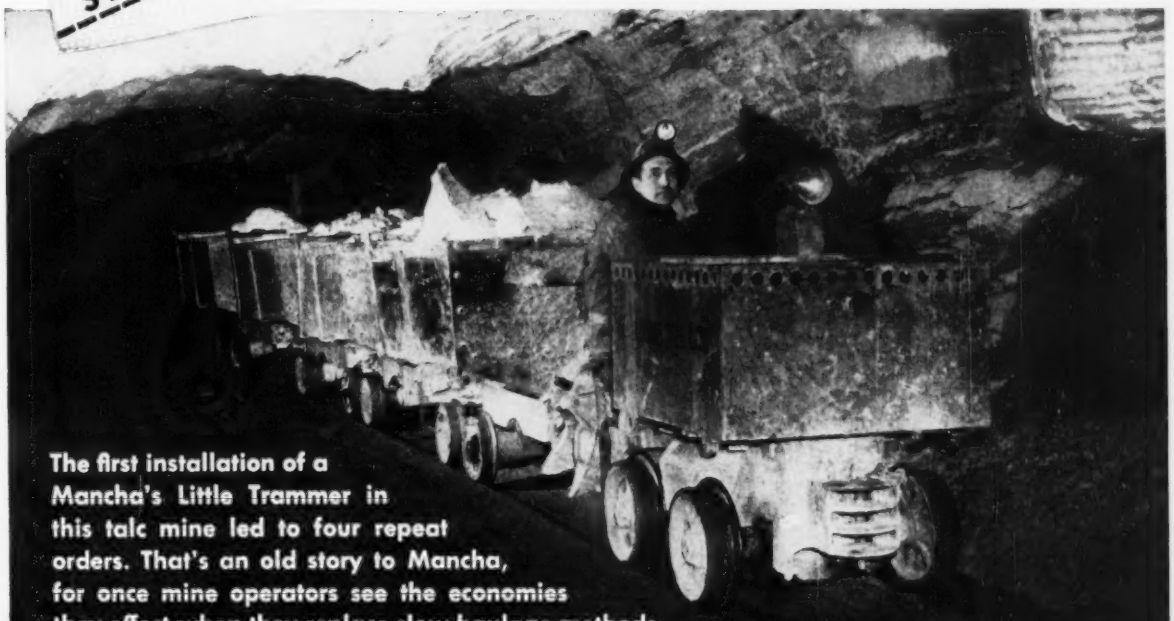
Allison TORQMATIC DRIVES

COMPACT, EFFICIENT HYDRAULIC DRIVES FOR TRUCKS * CRANES * TRACTORS * SCRAPERS * SHOVELS * DRILLING RIGS

SPEED UP HAULAGE
STEP UP PROFITS

.....with MANCHA'S LITTLE TRAMMER

A powerful 1½ ton storage battery locomotive known the world over for profitable haulage.



The first installation of a Mancha's Little Trammer in this talc mine led to four repeat orders. That's an old story to Mancha, for once mine operators see the economies they effect when they replace slow haulage methods with a Mancha's Little Trammer, they want to further increase those savings by putting *more* Mancha's to work, on a *variety* of haulage jobs.

Small enough for work in narrow, crooked drifts, powerful enough for difficult working conditions, Mancha's Little Trammer will perform profitably in your mine . . . for haulage duty, for moving mucking machines and drill jumbos, timber and supplies, or man trips to distant workings.

Will Mancha's Little Trammer pay in your mine?

Whether or not you are in the market for new haulage equipment

YOU CAN HAVE THE ANSWER NOW!

Mail the coupon today for our "mine haulage questionnaire." Return it to us with your answers and we will tell you how our Little Trammer will save you money as it does daily for scores of operators.

Mancha builds a complete line of storage battery locomotives. If the Little Trammer does not fully meet your job requirements we will recommend a locomotive that does.

Mancha Storage Battery Locomotive
Division GOODMAN Manufacturing Company
4850 South Halsted Street, Chicago 9, Ill., U.S.A.

E&MJ - 553

Send your haulage questionnaire.

NAME _____

FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

MANCHA STORAGE BATTERY LOCOMOTIVE
Division **GOODMAN** *Manufacturing Company*
4850 SOUTH HALSTED STREET CHICAGO 9, ILL., U. S. A.

-and now TAPER-LOCK

There's only ONE **TAPER-LOCK**

FROM the package to the shaft — ready, *immediately,* for the job! This is the new "off-the-shelf" availability which Dodge brings to roller chain drives. And, with this new availability, you get the important advantages of the famous Taper-Lock principle, proved in millions of V-belt installations.

No more costly and time-consuming boring of sprockets to fit your shafts! *Taper-Lock bushings are available in a range of sizes for the great majority of industrial applications.* And it's not necessary that shafts be turned and ground to get a tight fit. *Taper-Lock not only is keyed to the shaft, but grips it with the firmness of a shrunk-on fit.* Yet when a sprocket is to be replaced, it comes off easily, quickly. The bushing may be re-used.

Taper-Lock sprockets are compact. They have no flange, and no protruding parts. Taper-Lock occupies no more space on the shaft than standard sprockets. The flush design means safety.

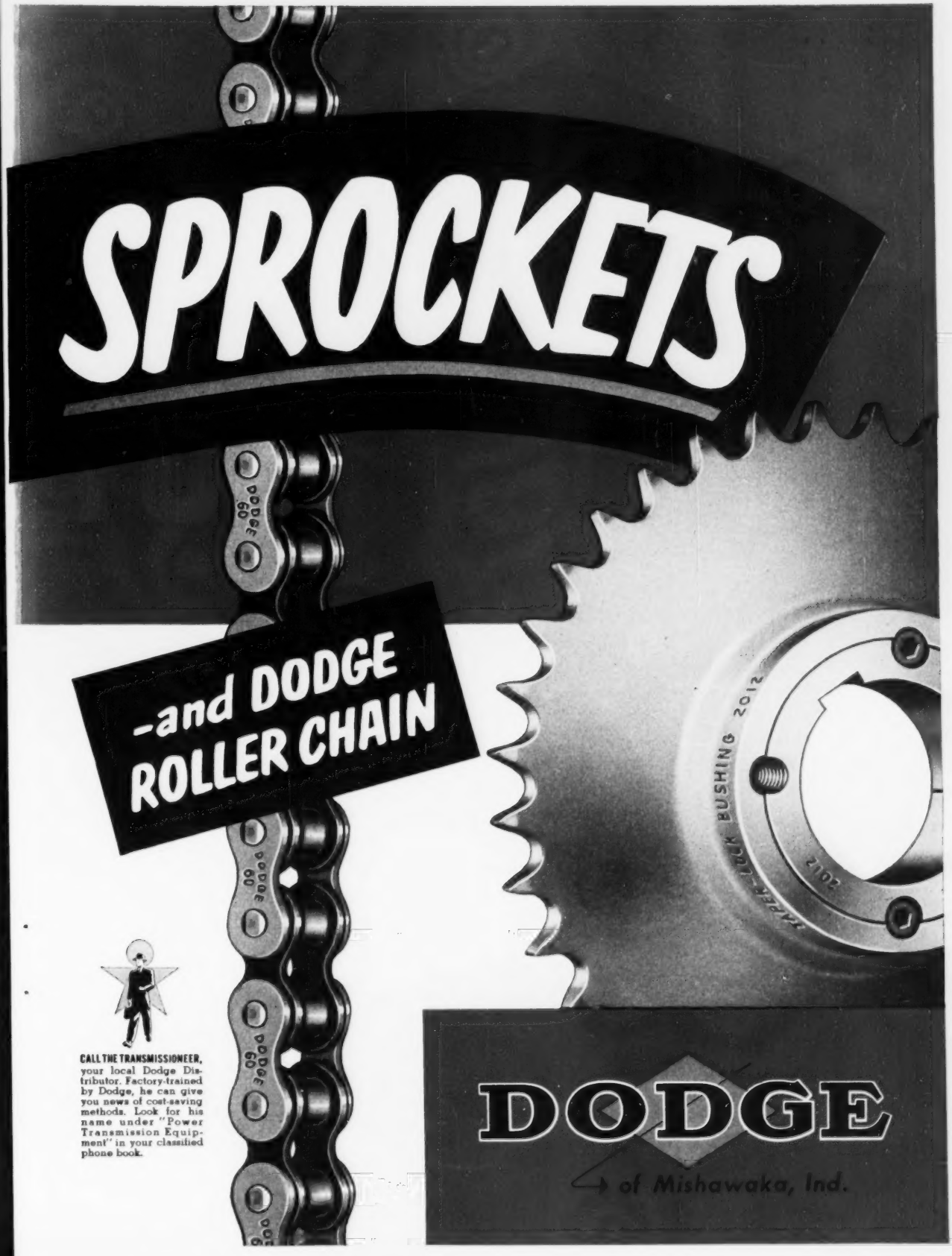
The new Dodge line of roller chain is made to highest quality standards, by craftsmen who know chain manufacture. Both chain and sprockets are made to ASA standards. Taper-Lock sprockets will take any make of American standard chain.

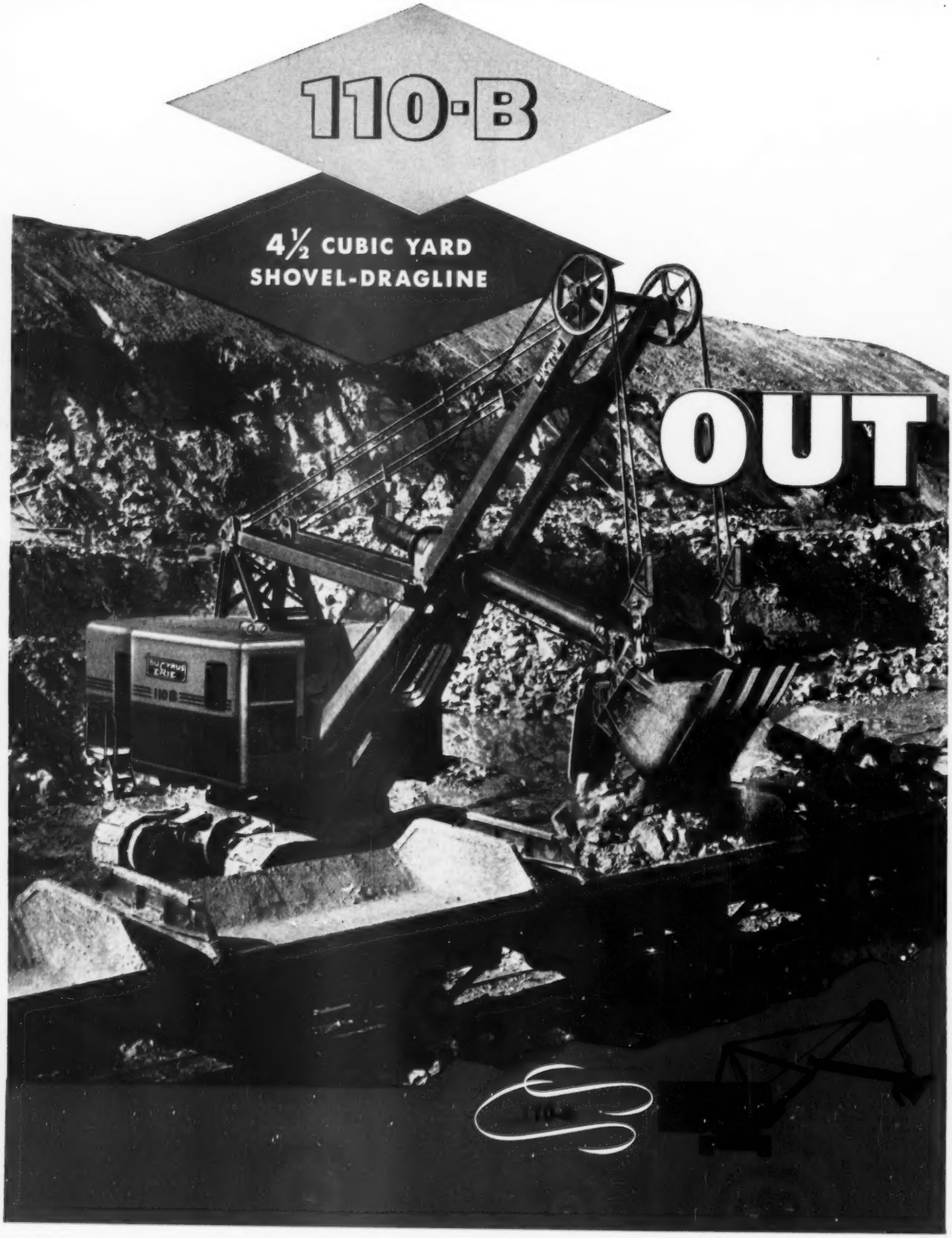
Taper-Lock sprockets will be carried in Distributors' stocks for immediate delivery, in a complete range of B-type steel sprockets—½" to 1¼" pitch. The range in ⅜" pitch, for example, is 12 to 112 teeth.

All bushings and the smaller sizes of sprockets are packaged individually. Dodge roller chain is packaged in 10-foot lengths — and can be furnished in 50-foot and 100-foot reels.

For detailed information about Taper-Lock sprockets and Dodge chain drives write now for Bulletin A-624.

DODGE MANUFACTURING CORPORATION, 3100 Union St., Mishawaka, Indiana


SPROCKETS
-and DODGE ROLLER CHAIN
DODGE 60
TAPER-LOCK BUSHING 2012
2012
CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory-trained by Dodge, he can give you news of cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.
DODGE
of Mishawaka, Ind.


110-B
4½ CUBIC YARD
SHOVEL-DRAGLINE
OUT

another slugger in the PUT lineup

Now — taking its place in the outstanding line of Bucyrus-Erie heavy-duty quarry and mine excavators is the field-proved 4½-yard 110-B — a convertible shovel-dragline which can give you bigger output in loading or stripping at lower cost than any other machine of like capacity on the market today.

Like the larger 150-B (6-yard) and 190-B (8-yard) machines, the 110-B features Bucyrus-Erie's exclusive shovel front-end. The strong, light two-section boom reduces weight and speeds digging cycle, yet provides ample strength for tough digging. Tubular dipper handle, free to rotate in saddle block, permits digging with one corner of dipper without introducing torsional strains. Powerful effective rope crowd reduces swing inertia because crowd machinery is located on revolving frame. And, twin dual hoist ropes concentrate power where needed to pull dipper through toughest banks.

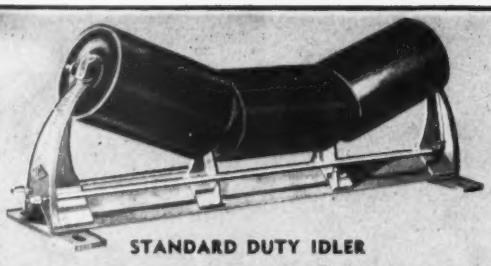
Before you buy any machine in the 4½-yard range, investigate the 110-B. It will give you consistently large output at lowest cost per yard. For detailed information, write today for Bulletin 110-B-1. 6L53C

BUCYRUS ERIE

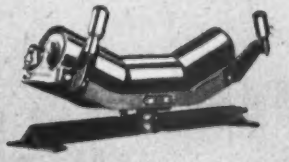
SOUTH MILWAUKEE, WISCONSIN

Another in the great modern line of Bucyrus-Erie quarry and mine excavators — yard for yard, dollar for dollar, pound for pound, the finest ever built.

THERE'S A *Continental* IDLER for every purpose

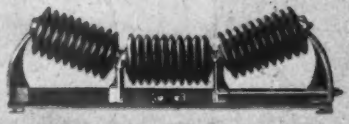


STANDARD DUTY IDLER



SELF-ALIGNING TROUGHING IDLER

SELF-ALIGNING RETURN IDLER



RUBBER DISC IMPACT IDLER

FLAT ROLL

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FLAT BELT IDLER

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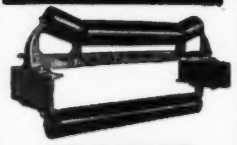
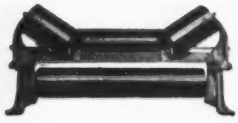
GRAIN FLAT BELT IDLER



PICKING TABLE IDLER



GRAIN CONCENTRATOR IDLER

UNIT STAND IDLER

Belt conveyors are used for handling many types of material. For this reason, Continental manufactures a variety of Idlers each designed to best take care of a particular application.

When ordering your next Belt Conveyor specify Continental Idlers and take advantage of our complete line.

Most standard size Idlers can be shipped FROM STOCK. Other sizes can be shipped promptly.

Specify **Continental**

AD 4804

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

FOR LOW-CURRENT CRUSHER STARTING

PLUS HIGH PEAK LOAD CAPACITY

Built for a crusher in a copper ore processing plant, this motor is rated 350 hp, 252 rpm.

WHETHER STARTING OR RUNNING, Allis-Chalmers wound-rotor motors fit your crusher drive requirements. Low starting kva minimizes power supply problems. High breakdown torque—250% or more if needed—gives you motors that romp through short-time peak loads . . . and compensates for line voltage drops.

Engineered to your specific requirements, these motors can be built for constant-speed crushing or to provide economical variable-speed operation.

DESIGN ADVANTAGES

Because Allis-Chalmers builds controls and crushers as well as motors, you can be sure that each motor design detail will be suited to the application.

Because each motor is built to uphold the Allis-Chalmers tradition of reliability, you can be sure of rigid shafts, sturdy welded stator yokes, ample even cooling, and liberally proportioned sleeve bearings.

Because routine inspection and maintenance extend motor life, you will get design features that simplify that work. For example, the brush rigging is supported below the bearing center line so that the bearing cap is easily removed.

NEW BULLETIN

Large pedestal-bearing induction motors are described in detail in illustrated Bulletin 05B7771. Ask your nearby A-C representative for a copy of this bulletin, or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-3724

ALLIS-CHALMERS

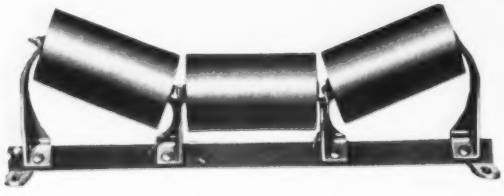
a big "hit" below the belt!

Nearly everyone realizes the advantages of belt conveyors for low-cost transportation of bulk materials. But what goes on below the belt is, perhaps, too often taken for granted. Certainly, the belt idler, more than any other piece of equipment, is responsible for the low cost of belt conveying per ton of material handled.

That's why Rex® Idlers are so often specified. Rex has been the leader in idler design and construction for over 25 years and sets the standard that others are working toward.

An idler must "keep rolling." If it freezes up, the belt will quickly wear through the roll, leaving sharp edges to cut your belt. The most common causes of idler "freeze-ups" are grit and dirt entering the bearings and build-up of material underneath the roll. To keep your Rex Idlers rolling, all you have to do is *keep your deck plates clean.* This will prevent material from building up on the rolls. The Rex Triple Labyrinth Grease Seal does the rest. The grease is there only to keep out dirt and grit, not to lubricate. With the special Rex seal design, the grease stays in . . . the dust stays out.

Remember, your idlers are the backbone of your entire belt conveyor. Don't gamble. Insist on Rex and be sure of a trouble-free performance year after year. For all the facts call your nearest Chain Belt Field Sales Engineer or write for Bulletin 51-81. Chain Belt Company, 4679 W. Greenfield Avenue, Milwaukee 1, Wisconsin.



For over 25 years Rex idlers have been recognized as leaders in the field of idler design. Now Rex again leads the way with the flexible grease line. Note the accessible protected location of the fitting. Extension of tubing to far side makes it possible to grease all rolls from one side . . . substantially reduces maintenance time.

CHAIN BELT REX COMPANY ®

Chain Belt COMPANY
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WIRE ROPE, too, resists attack with the RIGHT KIND of muscle

Brawny chest and shoulder muscles make the gorilla a formidable foe in the eternal warfare of the jungle. Defending himself and his family, this 450-pound heavyweight stands erect and fights back with sledge-hammer blows of his mighty forearms.

In wire rope, too, it takes the right kind of muscle to resist constant attack of abrasion, corrosion, bending fatigue, load strain and shock stress.

Complete quality control of Wickwire Rope means that you can always count on the right grade of steel and size of wire; the right construction and lay of the rope for best results on your particular job.

See your Wickwire Rope distributor or contact our nearest sales office.

WICKWIRE ROPE
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A YELLOW TRIANGLE ON THE REEL IDENTIFIES WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION — Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
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WICKWIRE SPENCER STEEL DIVISION — Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New York • Philadelphia

WICKWIRE ROPE

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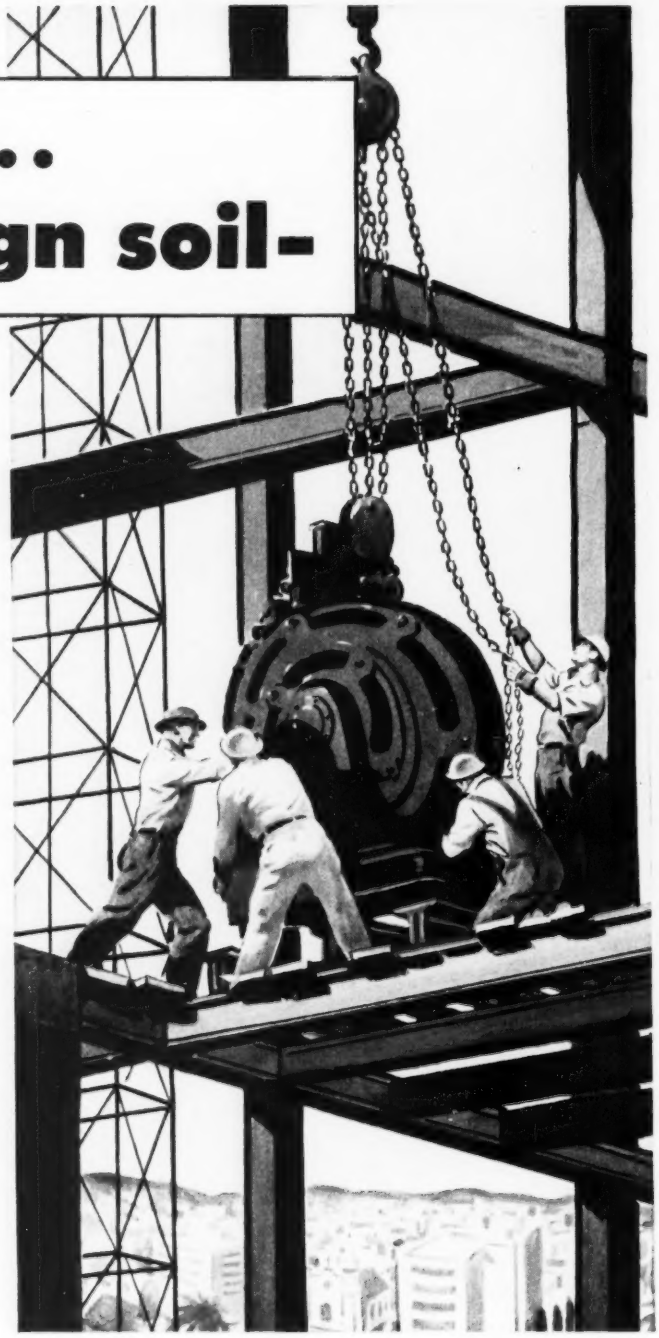
THE COLORADO FUEL AND IRON CORPORATION

Going up... on foreign soil-



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ENGINEERING REPORTS:

NEW TECHNIQUE OF COBALT FLOTATION was worked out in a pilot plant at Calera's Cobalt, Idaho installation to mill ore assaying 0.70 per cent cobalt. Reliability of the mill operation is promoted by the G-E engineered electrical system.

Calera will concentrate 1000 tons per day to ease cobalt shortage

Output kept continuous at new mine and mill by G-E engineered electrical layout

Soaring military demands for scarce cobalt—vital metal used in jet engines, armor plate, shells, and other weapons—will be met in 1953 with the help of the Calera Mining Company's new mine and mill at Cobalt, Idaho.

To keep the concentrator operating continuously, with fewest possible outages, this Howe Sound subsidiary turned to General Electric during the planning stage for help in engineering the electrical system. G-E application engineers designed—as a co-ordinated unit—the electrical layout for the mine, the mill, and the new town of Cobalt.

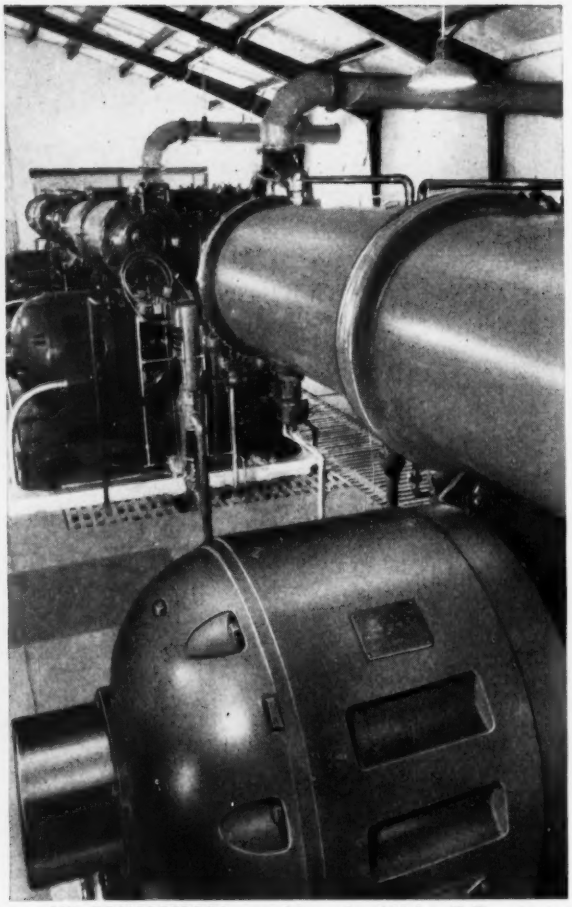
Thanks to the carefully planned flexibility of this electrical system, the Calera Company met government requests to increase the concentrator's capacity by 40 per cent without serious delay.

GENERAL ELECTRIC

TURN PAGE FOR PHOTO REPORT

1. ORE TRANSFERRED ON MINE LEVEL is handled by this 4-ton General Electric battery trammer.

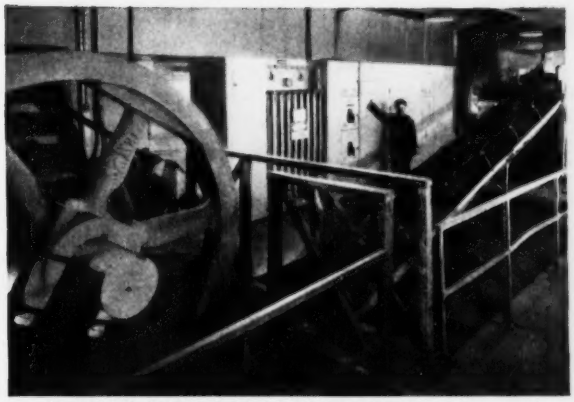
2. DEPENDABLE VENTILATION—to clear the air after blasting in the mine—is provided by this 30-hp totally-enclosed G-E motor. It runs continuously when the mine is worked.



3. AIR COMPRESSORS are driven by 300-hp G-E motors. Compressor building also houses a standby diesel generator which supplies emergency power for surface plant facilities.

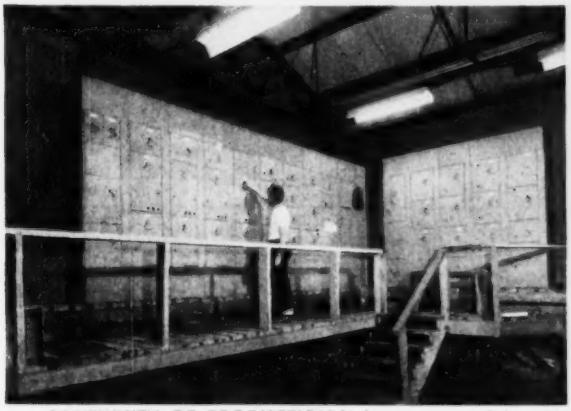
Major cobalt mine in U.S. relies

THIS 1000-TON CONCENTRATOR at Cobalt, Idaho, separates a copper, a cobalt, and an iron product. Crushing plant and concentrator are located close to mine portal. Treatment involves long conditioning of the pulp with lime at 80 to 90 degrees Fahrenheit.

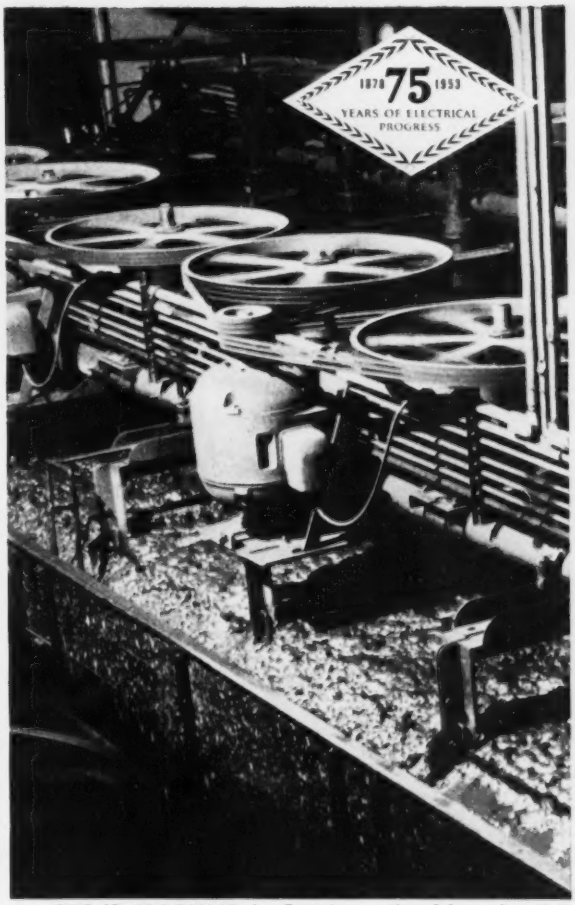


4. **PRIMARY AND SECONDARY CRUSHERS**—driven by G-E Tri-Clad* motors—are supplied from a 480-volt wye-connected, solidly grounded G-E load-center unit substation.

*Registered trade-mark of General Electric Co.



5. **CONTINUITY OF PRODUCTION** is better assured by this General Electric motor control center. It contains small motor starters, feeders for crane, lighting and power circuits.



6. **ORE IS PROCESSED** in flotation cells, driven by G-E motors, then concentrates are shipped to the Howe Sound Company's new $2,500,000 cobalt refinery at Garfield, Utah.

on co-ordinated electrical system

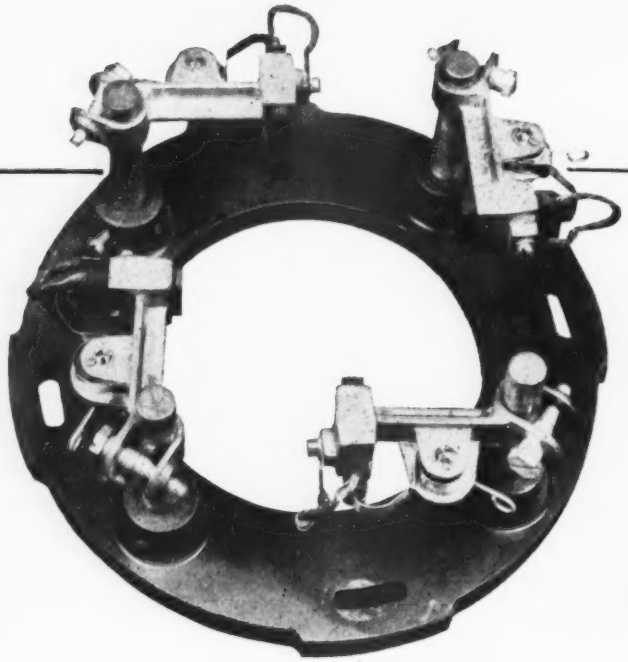
More than two years of pilot-plant testing—and the development of a novel technique of selective cobalt flotation—was needed before the new Calera mill started operating as the first major source of domestic cobalt.

To assure reliable power distribution and motor operation for the new installation, Howe Sound specified G-E equipment throughout. G-E application engineers, working closely with Howe Sound's engineers, designed a completely co-ordinated electrical system. Further, G-E service engineers were on hand for equipment start-up and during the "breaking-in" period. As an indication of their satisfaction with the electrical system, Howe Sound specified G-E equipment for their new $2,500,000 cobalt refinery at Garfield, Utah, just now going into operation.

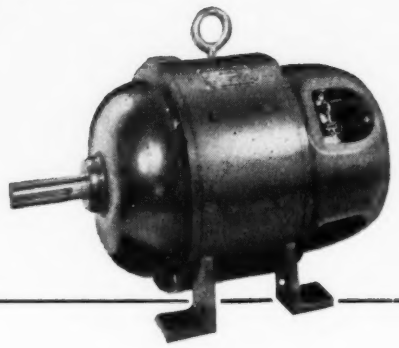
Whatever your electrical needs—large or small, modernization or expansion—G-E application engineers can help you and your consultants. Contact your local G-E Apparatus Sales Office. General Electric Co., Schenectady 5, N. Y. 660-28

Engineered Electrical Systems for the Mining Industry

GENERAL ELECTRIC



SK DEPENDABILITY



Arcs leave no tracks on this *MELAMINE* ring

When conducting dust collects across the surface of a rocker ring, it can cause a flashover. In the case of ordinary materials used for rings, this arc carbonizes a path into the ring itself. Thus, when the machine is cleaned to remove conductive particles, the path or track cannot be removed. High resistance grounds result. Motor efficiency is lost.

But, carbon flashovers don't have a chance on this Melamine ring. It's arc proof . . . noncarbonizing. There is no tracking effect . . . no "burned-in" paths to cause shorts. Thus, when you wipe the ring clean, it is restored to full service condition. Top motor efficiency is maintained.

That is one reason why the Life-Line SK offers users of d-c motors new dependability. Cast brass brushholders are another. They are noncorroding . . . have no bearings to wear or bind. No moving parts to get out of adjustment. A stainless steel spring maintains perfect brush contact through constant tension.

There are other reasons, too. Ask your Westinghouse representative to show you the inside story of the Life-Line SK motor. See the "Transvision" presentation. It takes the SK apart and puts it together again at your own desk. You'll see why something new has been added to SK dependability. Call your local representative today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21555-A

YOU CAN BE SURE...IF IT'S

Westinghouse

7 out of every 10

are repeat orders

ALLIS-CHALMERS
GRINDING MILLS

OPERATING MEN who have had actual experience with Allis-Chalmers grinding mills will usually specify A-C mills again... as proved by our sales records.

Repeat orders, of course, come only from customers who have been well satisfied. That's why we're proud of the fact that 7 out of 10 new Allis-Chalmers grinding mills go to operators for whom we have supplied mills in the past.

Ask the Allis-Chalmers representative in your area about the many high output and low maintenance advantages of Allis-Chalmers grinding mills. Or write for Grinding Mill Bulletin 07B6718A. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3845

ALLIS-CHALMERS

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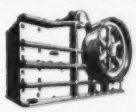
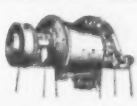
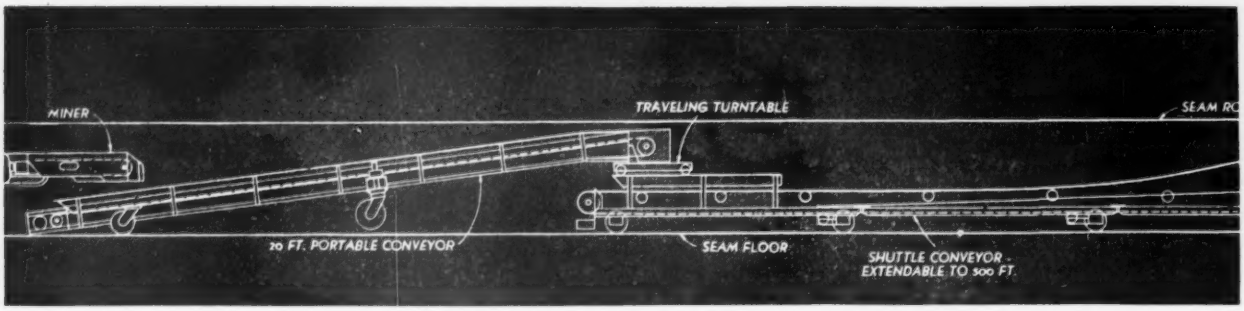

Jaw Crushers

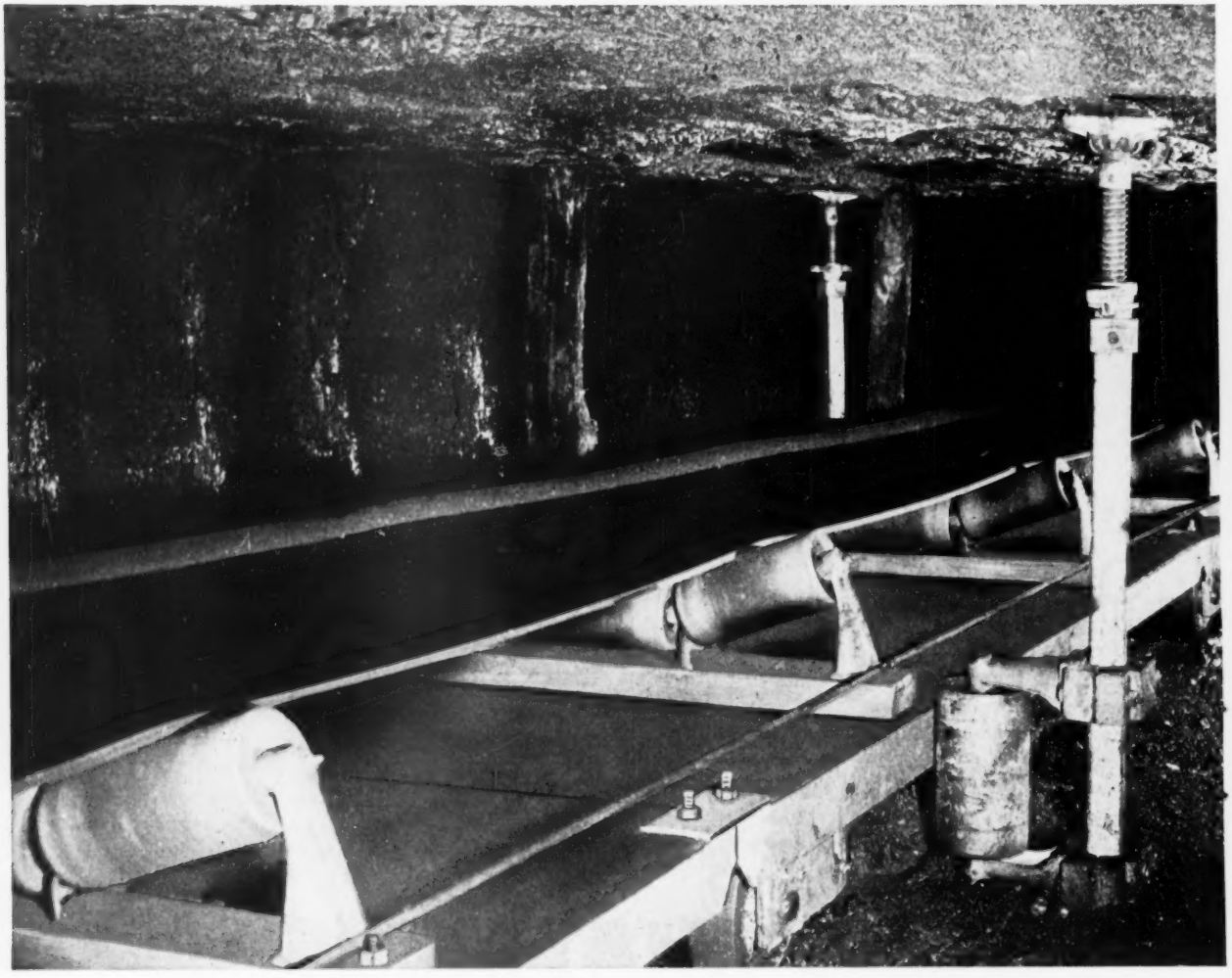
Gyratory Crushers


Grinding Mills

Kilns, Coolers, Dryers

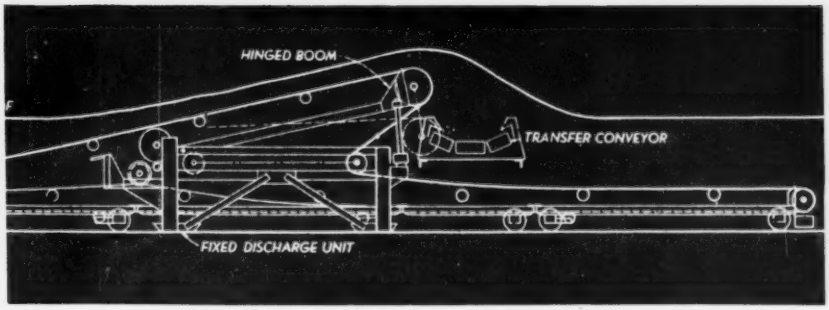


Here's the New Answer to



HEWITT-ROBINS

EXECUTIVE OFFICES, STAMFORD, CONNECTICUT



Continuous Mining

It's The Hewitt-Robins Mine Type Shuttle Conveyor With Fixed Tripper

The Hewitt-Robins Mine Type Shuttle Conveyor with fixed tripper forms the final link in a complete belt conveyor system that can handle an uninterrupted flow of ore directly from the face to the surface as fast as any mechanism can produce it.

This versatile unit is the key to truly continuous mining. The Shuttle Conveyor is both extendable and retractable—can follow the progress of mining and at the same time maintain a fixed transfer point through a fixed tripper and is extendable to 600 or 700 feet.

As the working face advances, the Shuttle Conveyor can closely follow the mining machine and receive its load either directly or from an intermediate transportation unit such as shuttle car or loading machine. The Shuttle Conveyor is so designed that alignment can be properly maintained by mounting small guide rollers on standard roof-jacks along each side of the conveyor frame, when operating off-track. When track-mounted, the guides are not required.

Remember, when it comes to any type of belt conveyor or complete belt conveyor systems, only one company—Hewitt-Robins—can assume single and unified responsibility for successful operation. For only Hewitt-Robins designs, engineers, manufactures and installs both the belt and machinery.

CHECK FOR INFORMATION ABOUT THESE JOB-TESTED PRODUCTS FOR YOUR OPERATION

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☐ —Belt ☐ —Dock
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☐ —Slope ☐ —Vibrating
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*For immediate information about these industrial rubber products, call your Hewitt Rubber Distributor (See "Rubber Products," Classified Phone Book.)

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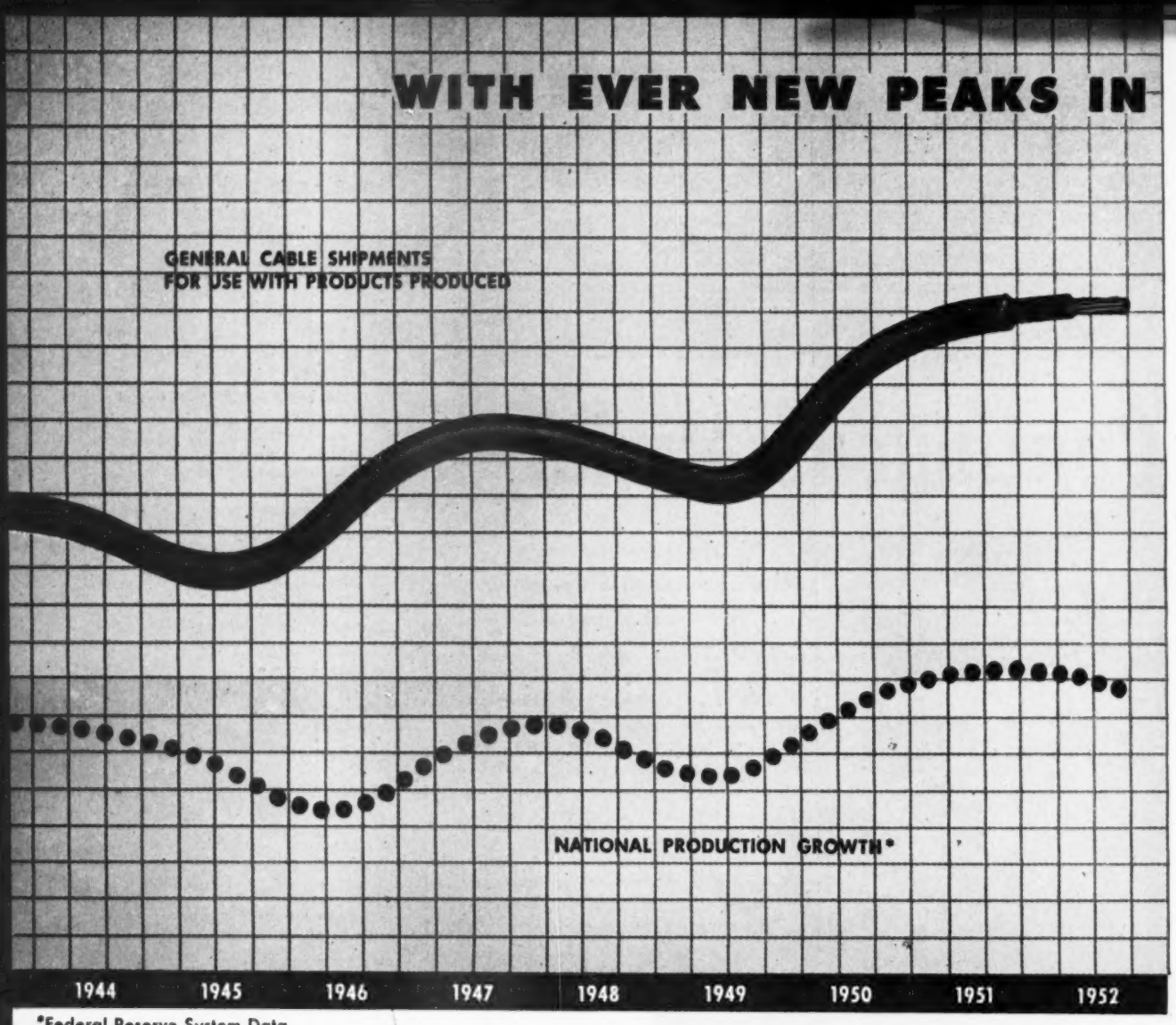
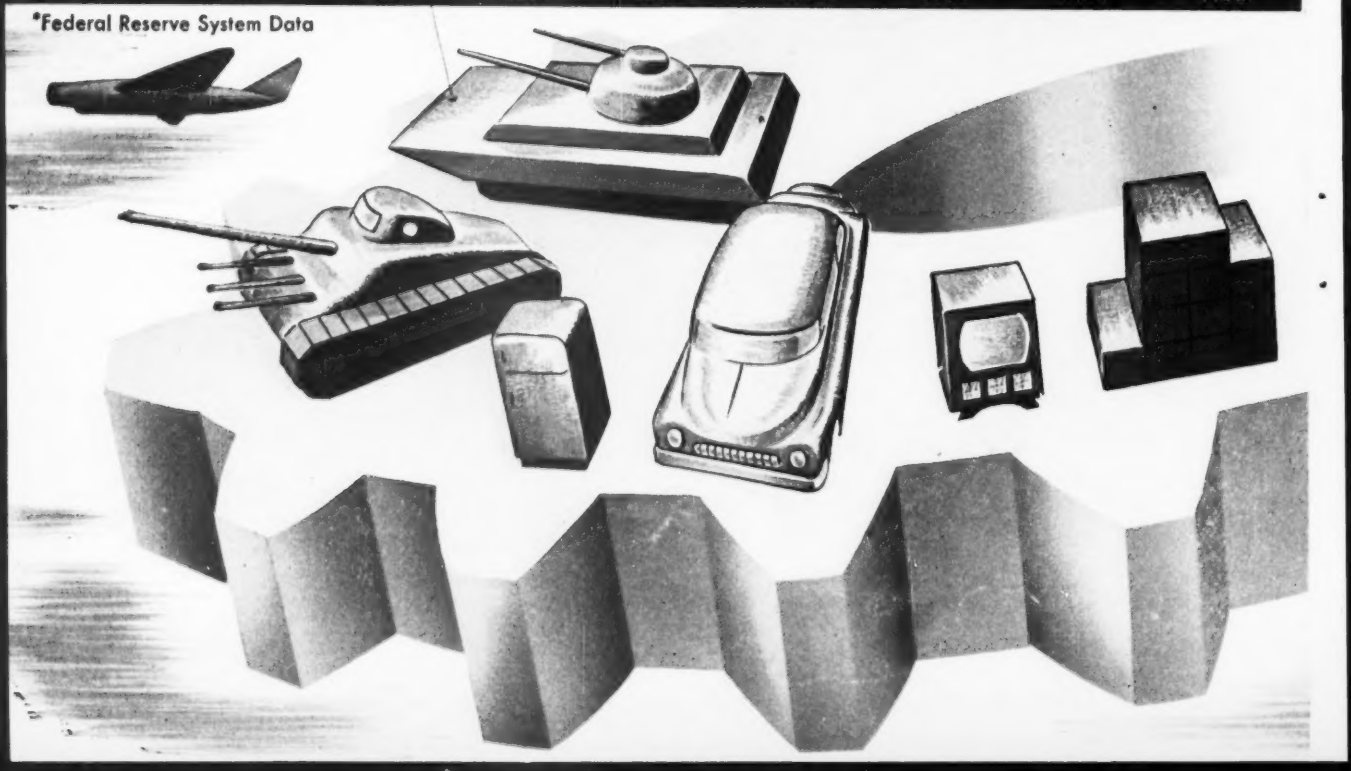
WITH EVER NEW PEAKS IN



*Federal Reserve System Data



NATIONAL PRODUCTION...

GENERAL CABLE

Still means Consistent Dependable Supply

During a 70 year span as a prime supplier of wire and cable to every industry, General Cable's growth has been part of America's ever-mounting national production. Anticipating production trends—with our sights always toward growth—our production is planned for smooth, adequate supply. Evidence is in the thousands of varied wires and cables manufactured in the chain of strategically located General Cable manufacturing plants. Your needs are serviced through our sales offices . . . through our wholesalers . . . from plants, warehouses, and distributor stocks that blanket the country from coast to coast, and from our northern border to the Gulf of Mexico.

"More Power to You"®

GENERAL CABLE
CORPORATION

EXECUTIVE OFFICE: 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK • SALES OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

Photo courtesy THE GALIGHER CO.

Bubbles in a flotation cell are very useful and wonderful. But when they spill over the launder and get onto the power cables, all kinds of trouble can result.

Power cables for flotation cell motors have an unusually difficult life. They are subject to alkaline solutions as well as exposure to oils. That's why we feel so strongly that you should use Simplex-ANHYDREX Cables to power your flotation cell motors. These cables have specially compounded neoprene jackets that are unusually resistant to oils and to chemicals of all types, both acid and alkaline.

The insulation, of course, is the famous Simplex-ANHYDREX insulation that will resist water and moisture for indefinite periods of time and still retain its electrical and physical properties.

For these reasons we believe that Simplex-ANHYDREX Cables will give longer, more satisfactory service than any other you can buy. Want to know more?

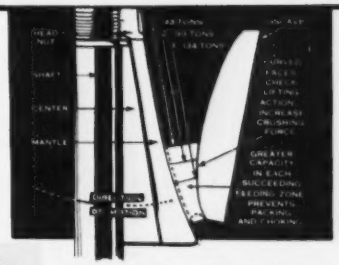
We'll be glad to send you a catalog!

Simplex WIRES & CABLES

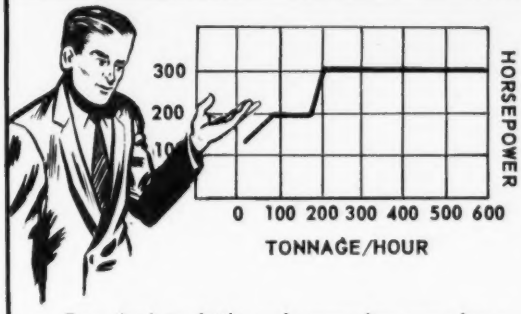
SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

You're paying for Efficient Production...

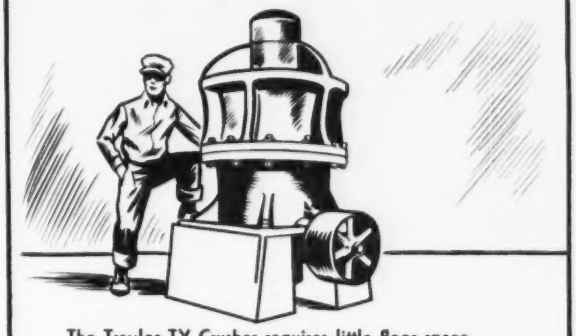
why not get it?



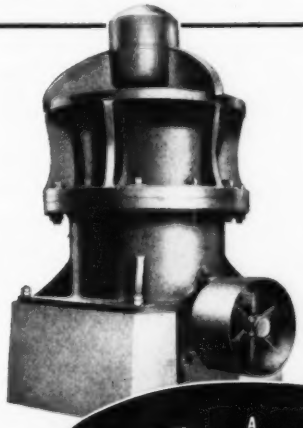
All Traylor TY Reduction Crushers are equipped exclusively with the non-chokable, self-tightening bell head and curved concaves shown above. Job tested in countless installations, they are proved for efficiency.



From feed to finish, each succeeding zone has a greater capacity than the one before it. This virtually eliminates choking and packing . . . enables a TY to produce exceptional tonnage per horse power.



The Traylor TY Crusher requires little floor space . . . little head room. Its compact design includes Traylor's own non-chokable Bell Head and curved concaves for greater production efficiency.



A **Traylor** LEADS TO GREATER PROFITS

SHOW ME how Traylor design and construction features will give me more for my crushing dollar. Send complete specifications and illustrations immediately.

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Position: _____

Company: _____

Address: _____ State: _____

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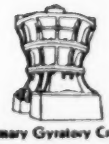
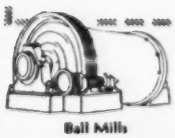
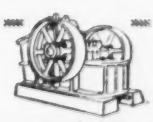
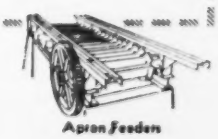

Primary Gyratory Crushers

Rotary Kilns

Secondary Gyratory Crushers


Ball Mills


Jaw Crushers


Apron Feeders

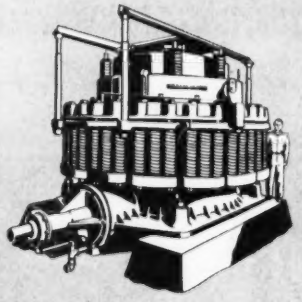
Statue of "The Grinder", represents a Scythian slave whetting a knife on an irregular shaped, natural sharpening stone.

ABRASIVES *have been the* "Silent Partners" *of World Progress*

Since ancient man's first need for tools and weapons, abrasives have been a decisive factor in shaping the progress of civilization. As man's manufacturing abilities increased, natural abrasives were no longer sufficient . . . which led to the use of the first manufactured grinding wheel. Today, practically every man-made product depends upon abrasives.

Of utmost importance in processing, prior to the manufacture of the finished abrasive product, is the method of reducing the hard component materials into workable sizes as quickly and efficiently as possible. *Here, as in all other fields where fast, low cost reduction is paramount for profitable production, SYMONS* Cone Crushers are widely used by the leading producers of abrasive products . . . to produce a constant, uniform size of material.*

NORDBERG MFG. CO., Milwaukee, Wisconsin C-253



SYMONS* Cone Crushers . . . the machines that revolutionized crushing practice . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter — in capacities from 6 to 900 tons per hour.

*SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD.

NORDBERG MACHINERY

NORDBERG

SYMONS SCREENS NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO
MEXICO, D.F. • LONDON • PARIS • JOHANNESBURG

Carving through hard limestone on U. S. 22 By-pass

▲ **SLICING THROUGH**—This hill of solid rock, cut to a maximum depth of 55 ft below grade, calls for drilling and blasting 70,000 cu yd of tough limestone. Floyd Coveney is job superintendent for the contractor. Russell E. Boyer is District Engineer for Pa. Dept. of Highways.

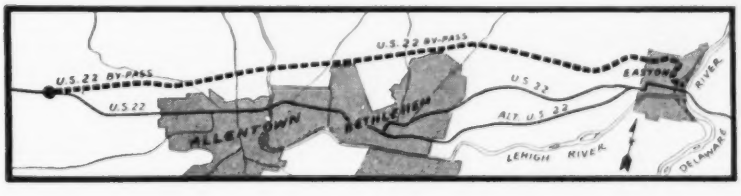
◀ **FROM THE AIR**—Looking west, the by-pass takes shape in early January. The 1.1 mile section, between arrows, skirts the boundaries of Easton Cemetery along winding Bushkill Creek. Lafayette College is in the right foreground.

▼ **HARD LIMESTONE**—The wagon drill crew hoists a long rod of Bethlehem Hollow Drill Steel into position for drilling. Holes up to 18 ft in depth are drilled with carbide-tipped bits.

One of the toughest sections under construction on U. S. 22 By-pass in eastern Pennsylvania is a 1.1 mile stretch within the city of Easton. This $729,600 contract, held by Central Pennsylvania Quarry, Stripping & Construction Co. with the Pennsylvania Department of Highways, calls for excavating, drainage and paving two 24-ft roadways immediately west of an elevated approach to the bridge over the Delaware River. Completion of the contract is expected by September.

Nearly all of the 277,000 cu yd of excavation is limestone so tough that tungsten-carbide-tipped bits must be used in drilling an estimated 130,000 ft of hole. "Central Penn," with headquarters in Hazleton, Pa., has been a steady user of Bethlehem Hollow Drill Steel for 20 years. "It's always been satisfactory," says John B. Bruns, general superintendent.

▼ **RELIEF FOR HEAVY TRAFFIC**—About 22.5 miles of the 4-lane by-pass is now under construction, from the Delaware River at Easton to a point west of Allentown. Its completion will bring much-needed relief for heavy traffic which flows between Harrisburg and New York.



BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM HOLLOW DRILL STEEL

BETHLEHEM STEEL

Disposal of 1140 long tons per hour of overburden and lean ore is easily accomplished by this Link-Belt 36-in. wide belt conveyor system.

TOTAL ENGINEERING

It's LINK-BELT's answer for improved belt conveyor performance

BELT conveyor efficiency begins with correct analysis of overall system requirements. And right from the start Link-Belt offers you unique advantages. Our engineers can apply broad experience to your bulk handling problems.

Working with a complete line of quality components, they can select the belt conveyor equipment best suited to your exact needs. What's more, Link-Belt has a nation-wide engineering organization that will follow through on every detail. This includes supplying all related equipment . . . building supporting structures and enclosures . . . erecting the complete job, if desired.

It's easy to see why "total engineering" results in top belt conveyor performance. For complete information, call the Link-Belt office near you today.

13,131-D

LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

LINK-BELT builds a complete line of belt conveyor components

ALL TYPES OF ROLLER BEARING IDLERS

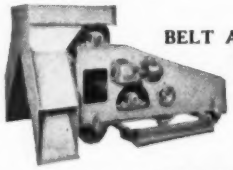
Impact-cushioning idler

45° troughed idler

Belt-training idler

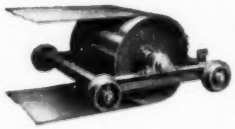
20° troughed idler

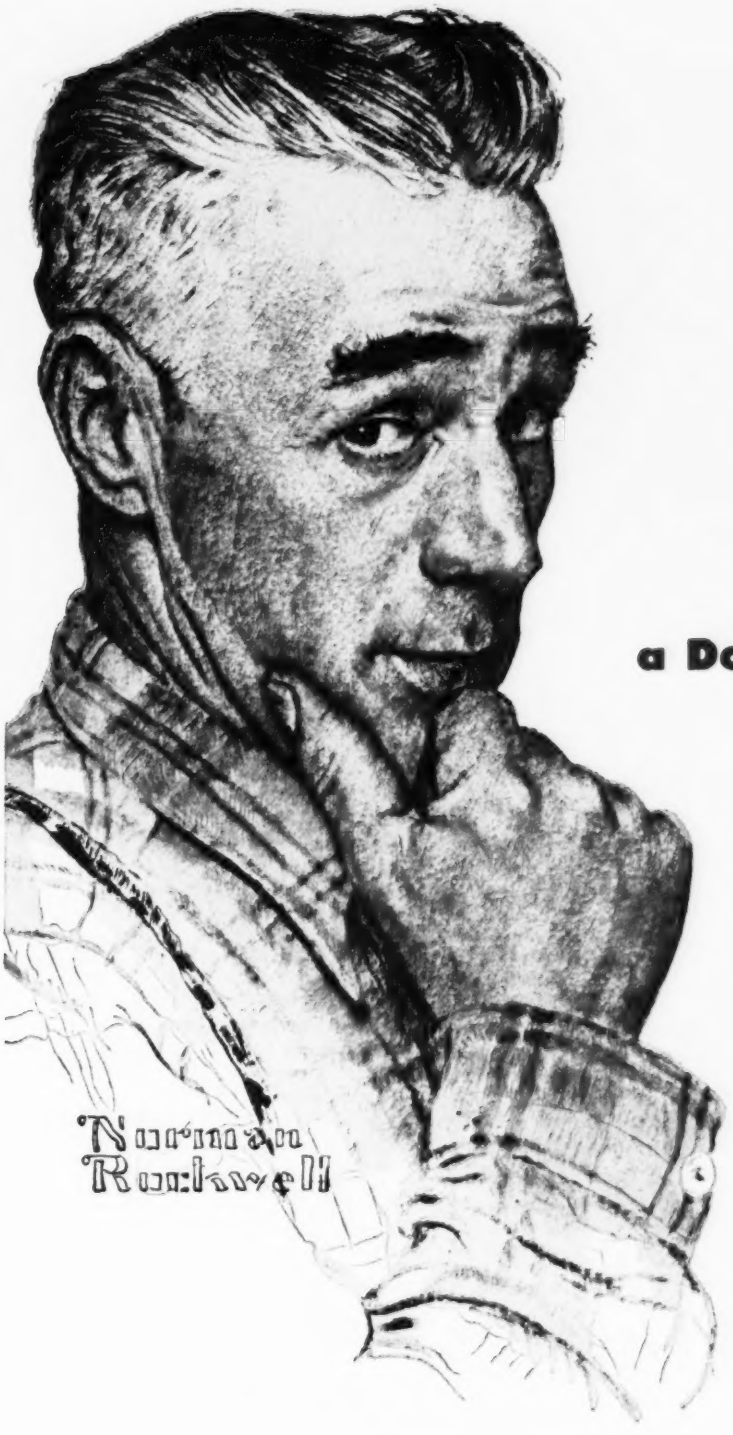
Return idler



BELT AND MOTOR PROPELLED TRIPPERS

COMPLETE TERMINAL MACHINERY





You?...

a Doubting Thomas?

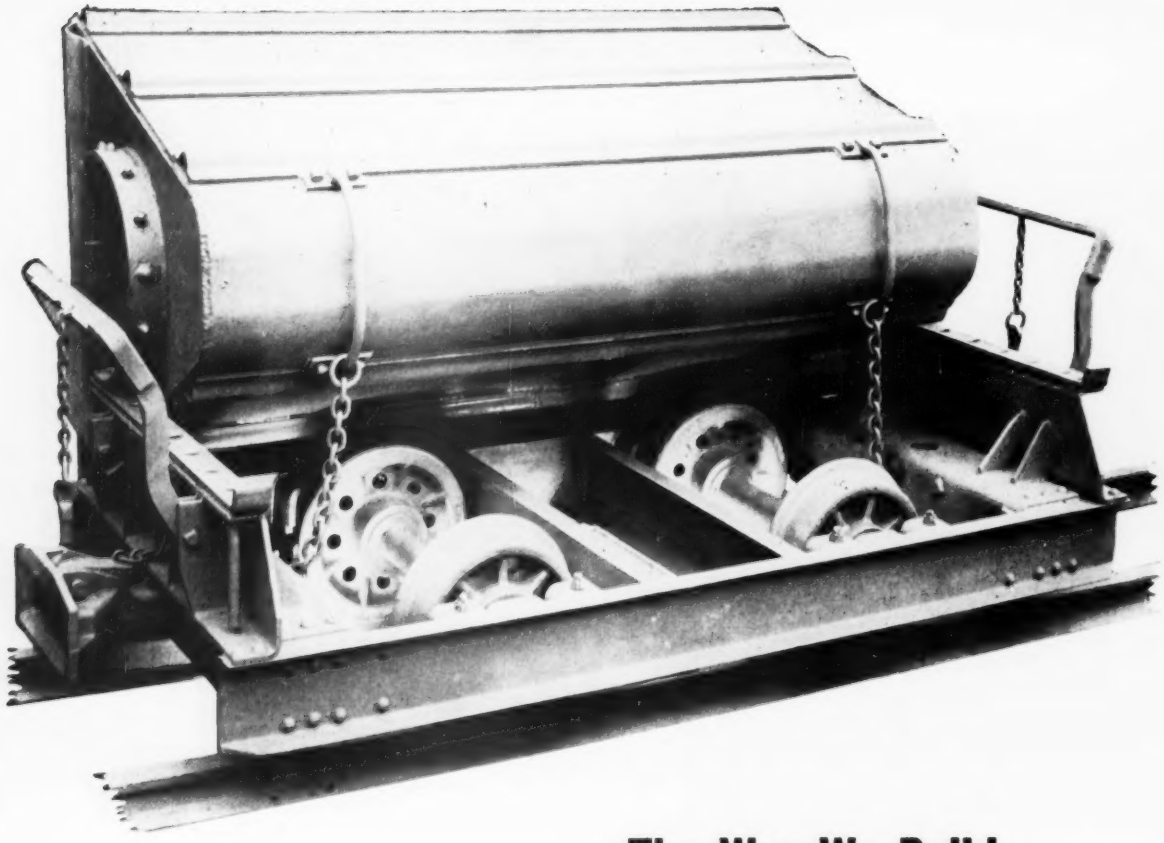
IF YOU'RE a man who has to be shown, we're right in your corner. Just give Roebling "Blue Center" Steel Wire Rope one try... see for yourself how it saves time and costs you less on the job.

Two out of three wire rope users in the mining field prefer Roebling rope. Call your nearest Roebling office for a Field Man to suggest the best rope for your purposes.

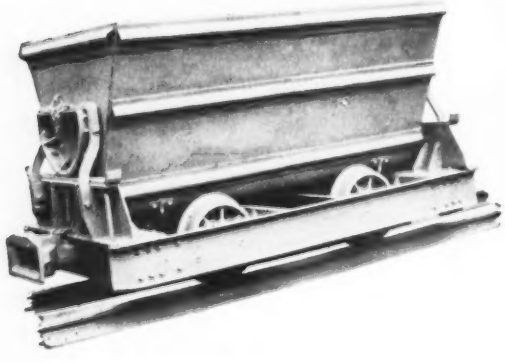
ROEBLING CF&I

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE TRENTON 2, N. J.



The two photographs in this ad show the S-D Rocker Car in detail while in hauling and dumping position.



The Way We Build Rocker Cars, They Should Last forever!

Nothing is overlooked to make S-D Rocker Cars your best possible buy for long life and minimum maintenance. We know the terrific punishment a Rocker Car has to take in service. We know that skimpy fabrication is false economy. Consequently, you'll find in S-D Cars extra welding . . . extra rivets and extra reinforcing where it should be . . . cars designed and built up to a service requirement, not down to a price.

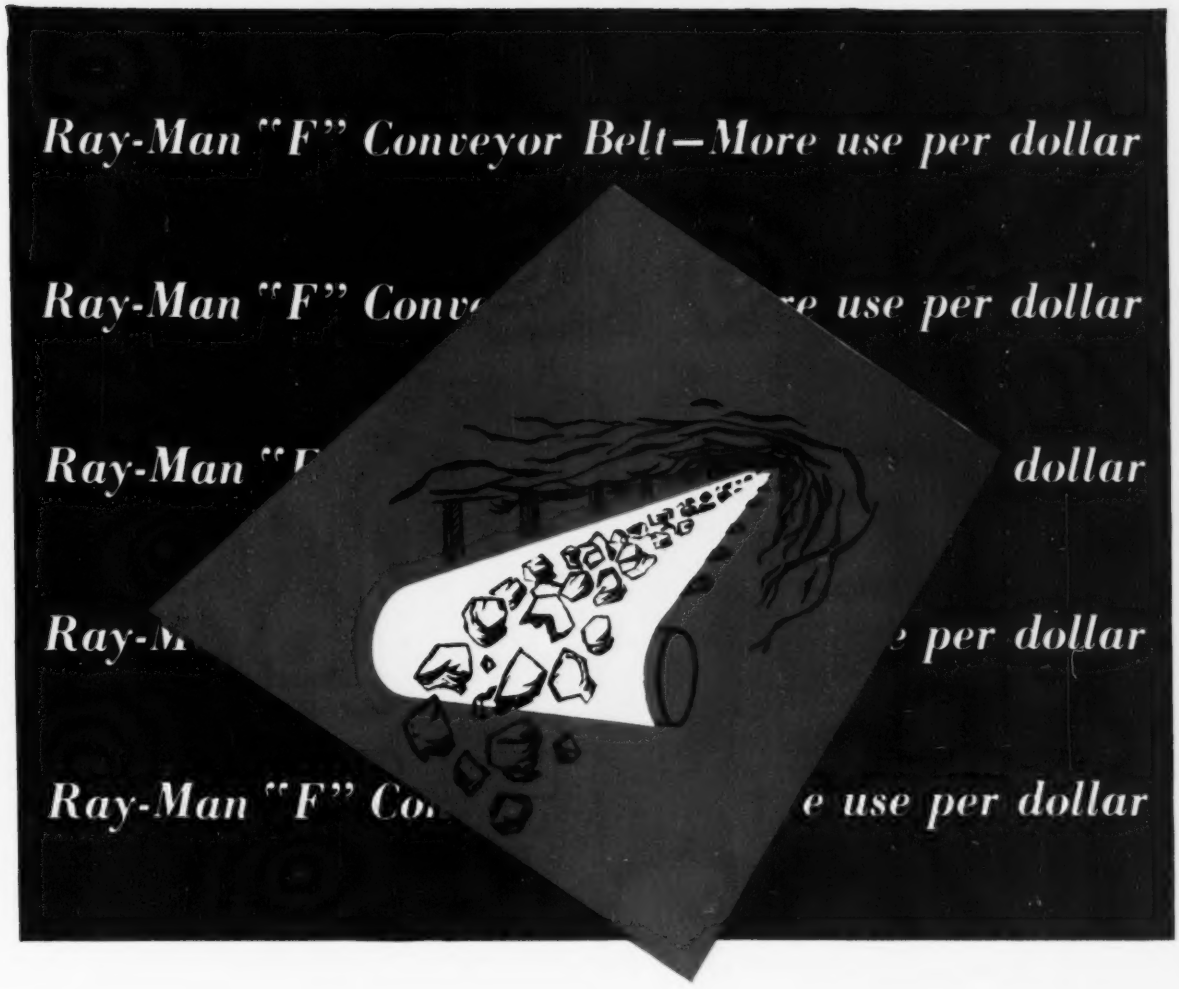
This manufacturing policy accounts for the constant flow of repeat orders we are favored with by our customers.

Regardless of the type of car you need, you'll find us building them as they should be built for a long life of trouble free operation, continuous service and lowest maintenance.

We would like getting together on your car requirements.

SANFORD-DAY IRON WORKS

KNOXVILLE——————————TENNESSEE

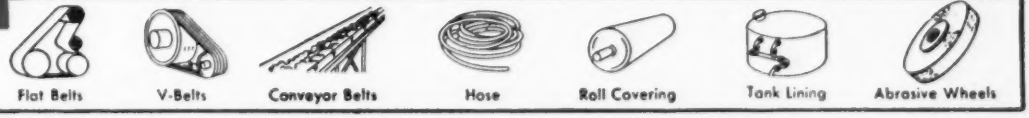

Ray-Man "F" Conveyor Belt—More use per dollar
Ray-Man "F" Conv e use per dollar
Ray-Man " dollar
Ray-M per dollar
Ray-Man "F" Co e use per dollar

ON ABUSIVE HAULS... Ray-Man "F" will cut costs where your conveyor belts are commonly exposed to tearing or puncturing . . . where pulleys are small . . . where fastener failure is a particular problem. The unique properties of synthetic fiber strength members make possible these advantages. Ray-Man "F" also gives you everything you require in a general purpose belt—flexibility, troughability, impact resilience, ease of training, strong cover adhesion—MORE USE PER DOLLAR. Ask the R/M distributor for Bulletin 6915. Ask him, too, about Homocord, R/M's extra-cushioned conveyor belt for heavy impact loading. R/M field engineers back him up to give you MORE USE PER DOLLAR—not only in conveyor belts, but in hose, transmission and V-belts.

R M

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

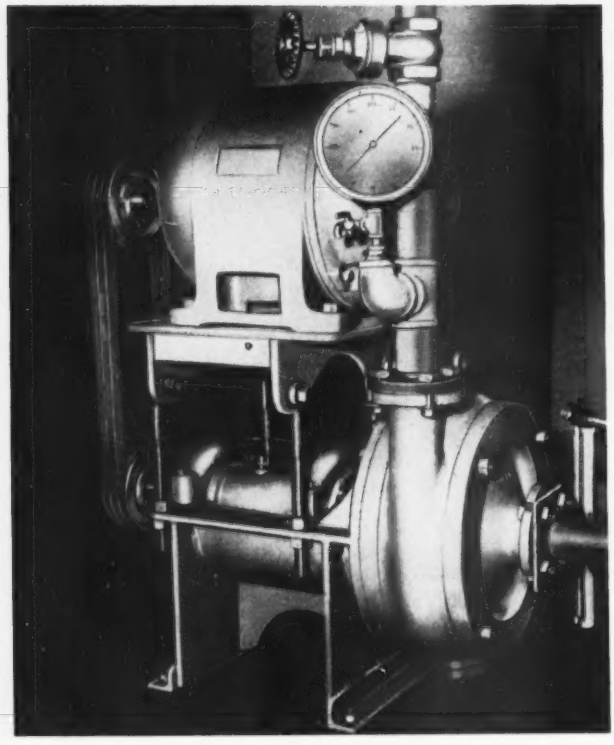
RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls

3rd year of successful service

VACSEAL VERTICAL & STANDARD PUMPS



WRITE FOR CATALOG

Gives full details on unique VACSEAL "glandless" feature that eliminates impeller adjustments and requires no sealing water to protect glands and clearance spaces.

This success story concerns a Vacseal Pump — the first manufactured and put in service in the United States. It was installed for the handling of abrasive pulps back in 1950. Its three years of operation has been satisfactory in every way. Only one part has been replaced and the pump has required minimum servicing. In fact, this and many other Vacseal Pumps — vertical and standard — have been used in exhaustive and gruelling tests over the 3-year period, handling both abrasive and corrosive materials. The detailed records spell out . . .

EXCELLENT SERVICE

Leaders in Experience & Service

THE GALIGHER CO.

METALLURGICAL DIVISION · GALIGHER COMPANY · ENGINEERING SERVICE

CONSULTATION • ORE TESTING
PLANT DESIGN • GEOLOGIC INVESTIGATION

HOME OFFICE
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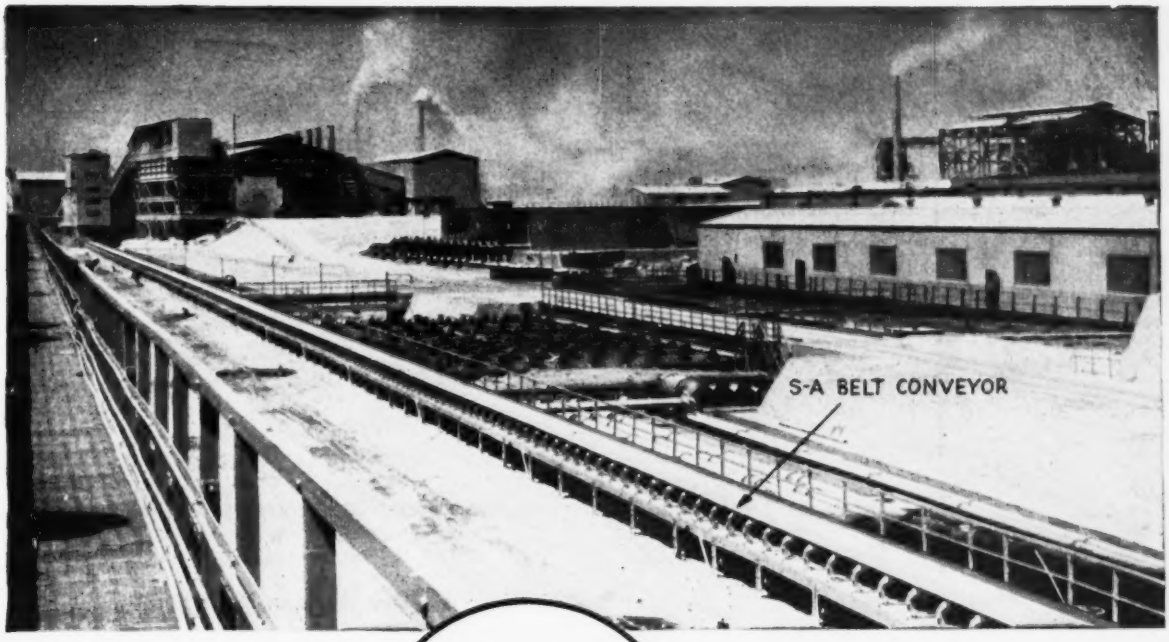
Salt Lake City, Utah
P. O. Box 209

EASTERN OFFICE
921 Bergen Avenue
Jersey City, New Jersey

Agents In All Principal Foreign Mining Districts



New carriers, "exactly the same as originally furnished," were ordered by the owners when planning an extension to their conveyor system. The 60" wide conveyor, which has moved over 90 million tons of crushed and screened ore, is equipped with S-A Style No. 444 live shaft, heavy duty carriers.

S-A CONVEYING Systems

for Heavy Duty **ORE HANDLING—** **ALWAYS** at Lowest Cost per Ton

S-A bulk materials handling equipment has cut costs and provided efficient handling in scores of ore mining and processing installations. That's why, over and over again, owners have re-ordered S-A equipment for extensions and enlargements of their ore handling facilities.

During its more than 50 years in the bulk materials handling field, Stephens-Adamson has developed a complete line of equipment and an experienced engineering staff. This combination of men and equipment enables S-A to design and build conveying systems that will move your materials at the lowest cost per ton. Write for details today.

Belt Conveyors
Belt Trippers
Belt, Pan & Plate Feeders
"AMSCO" Steel Pan Feeders
Ship Loading Boom Conveyors
Stacking Conveyors
Storage & Reclaiming Systems
Flight & Chain Conveyors
Screw Conveyors
"Natural Frequency" Vibrating Conveyors
REDLER Conveyor-Elevators
ZIPPER Conveyor-Elevators
Conveyor Belt Cleaners
Headshaft Holdbacks
Grizzlies & Screens
Centrifugal Pilers
Bin Gates & Tunnel Gates
Car Pullers & Spotters
Hoists & Winches
Bucket Elevators
Skip Hoists
SEALMASTER Ball Bearing Units

Write for a bulletin on any of the above.

STEPHEN S-A ADAMSON MFG. CO.

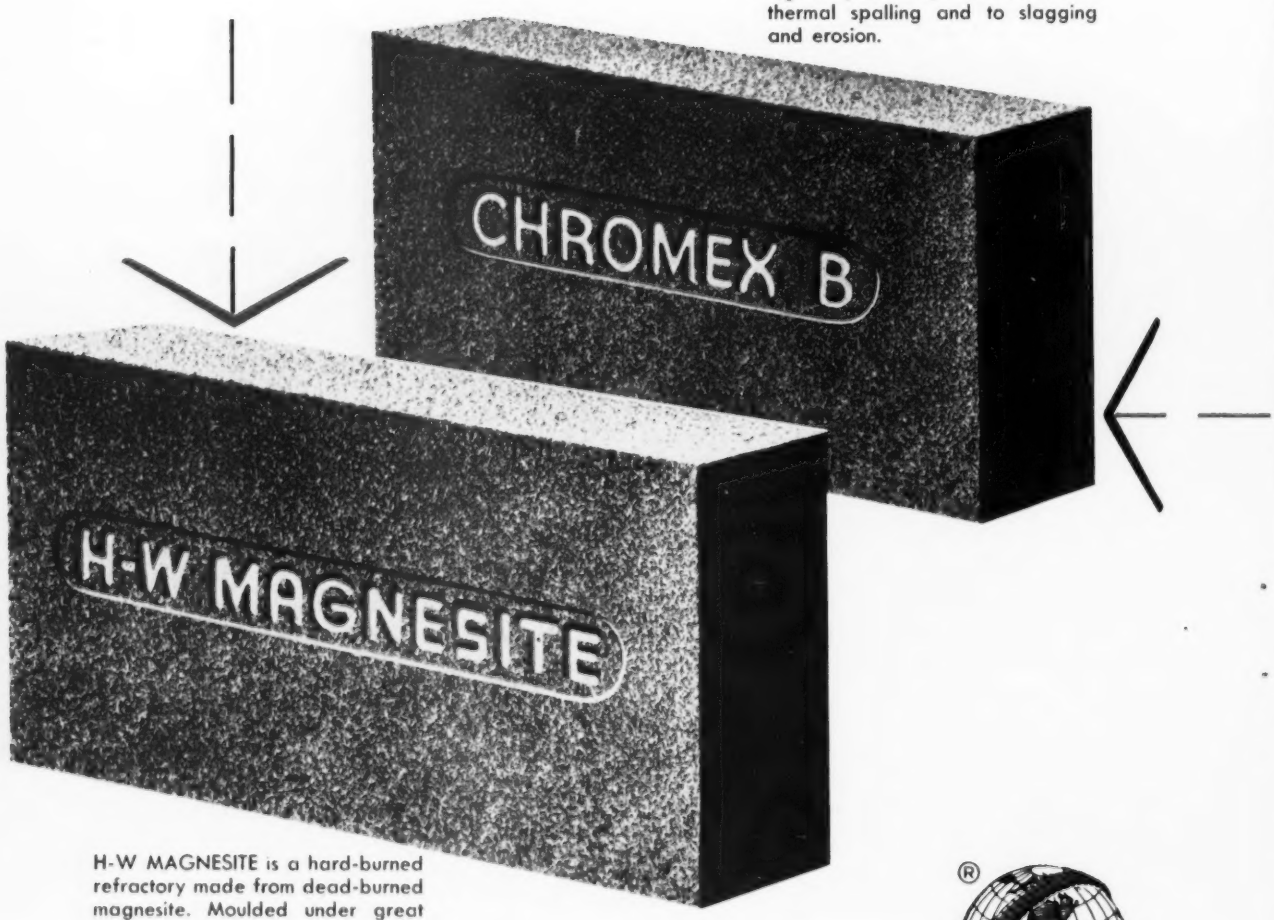
4 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif., Belleville, Ontario

Two great basic refractories...

for smelting, refining and melting furnaces

CHROMEX B

CHROMEX B is an extremely hard-burned, dense, chrome-magnesite refractory, notable for its stability of volume and high strength at high temperatures, and resistance to thermal spalling and to slagging and erosion.



H-W MAGNESITE is a hard-burned refractory made from dead-burned magnesite. Moulded under great pressure and fired at high temperature. Recommended for use where a strongly basic lining is required.

®

Harbison-Walker

and H•W MAGNESITE

The excellent performance of basic refractories in applications where conditions are particularly severe has brought about increased interest in these products. Harbison-Walker has been a leader in the development and manufacture of basic refractories, and has long specialized in this class of products. The complexities of manufacture require a skilled, highly-trained organization, and Harbison-Walker is fortunate in having the personnel required to produce basic refractories of consistently high quality.

Two of the most widely used brands in the Harbison-Walker line of basic refractories are H-W Magnesite and Chromex B. Both find many applications in smelting, refining and melting furnaces. We will be glad to assist you in applying these refractories to best advantage.

HARBISON-WALKER BASIC REFRACTORIES

are used advantageously for

Aluminum Melting Furnaces • Copper Converters and Holding Furnaces • Copper Reverberatory Furnaces • Anode and Wire Bar Furnaces • Secondary Metal Melting Furnaces • Lead Softening and Reverberatory Furnaces • Open Hearth and Electric Furnaces • Nickel Furnaces

HARBISON-WALKER REFRACTORIES COMPANY

AND SUBSIDIARIES — GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA

World's Largest Producer of Refractories

"Attach the detonating cap properly . . . Primacord will do its job safely, effectively

"This is the last job before the blast. Holes are loaded with a branch line in each one. You've laid your trunk line and connected your branch lines at right angles to it. Men and machines have been removed. You've checked and double-checked – everything's ready.

"*Now* attach the detonating cap to the Primacord. Up to this point, your blast – hooked up with Primacord – cannot be set off by sparks, friction, ordinary shock or stray electric currents. Primacord *must* be detonated with a blasting cap attached to one end of the trunk line.

"Place the cap and fuse alongside the end of the Primacord trunk line and bind together lightly but firmly with friction tape. Don't tie them together with string or wire – don't lay them under a rock! Place the cap gently on the ground and lay out your length of safety fuse*.

"Remember – in blasting, safety is a sign of skill. Be careful, all-ways."

Ask your explosives supplier, or write for further facts to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Also Safety Fuse since 1836

* Primacord can also be detonated with an electric blasting cap.

1. Cut the Safety Fuse squarely across with a clean, sharp knife to expose the powder core. Be sure you cut the fuse long enough, because a little more fuse is a lot more safety.
2. Seat this freshly cut end lightly but firmly against the charge in the blasting cap, and crimp cap onto fuse with a crimping tool.
3. Lay the Safety Fuse and its cap alongside the end of the Primacord trunk line, and bind lightly but firmly together, using friction tape. Place the cap gently on the ground and lay out your length of Safety Fuse.
THE ENSIGN – BICKFORD CO.
PRIMACORD
BICKFORD
SIMSBURY, CONN.

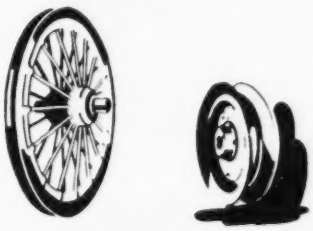
Use PRIMACORD®

The PROVED and APPROVED DETONATING FUSE

Deadweight Down Payloads Up with

LAKE SHORE MINING EQUIPMENT

Skips and Cages—all types.

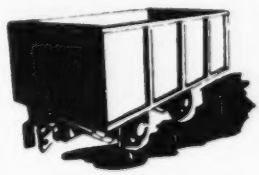


Sheaves—Roller Bearing, Rotating Shaft and Split Type Bicycle Sheaves . . . Cast Iron, Steel and Aluminum Idler Sheaves.

PRODUCTION INCREASES OF 8% and more have been recorded with the installation of Lake Shore engineered mining machinery, like the aluminum and steel Jeto Bottom Dump Skip (above). Lake Shore mining equipment is designed and built by men who know the field, men who know where and how to use weight-cutting aluminum, how to round the corners of tram car for greater rigidity and cleaner dumps . . . men who originated the roller bearing bicycle type head sheave and bell mouth idler sheave.

Lake Shore's experienced engineering is at your disposal either in existing models, or for the design of special machinery your operation may require.

Write today for free CATALOG 450-A.



Mine Cars—Lohed Tram Cars, Granby Type, Self-propelled Trestle Cars, Man Haul Cars.

101

LAKE SHORE Engineering Company

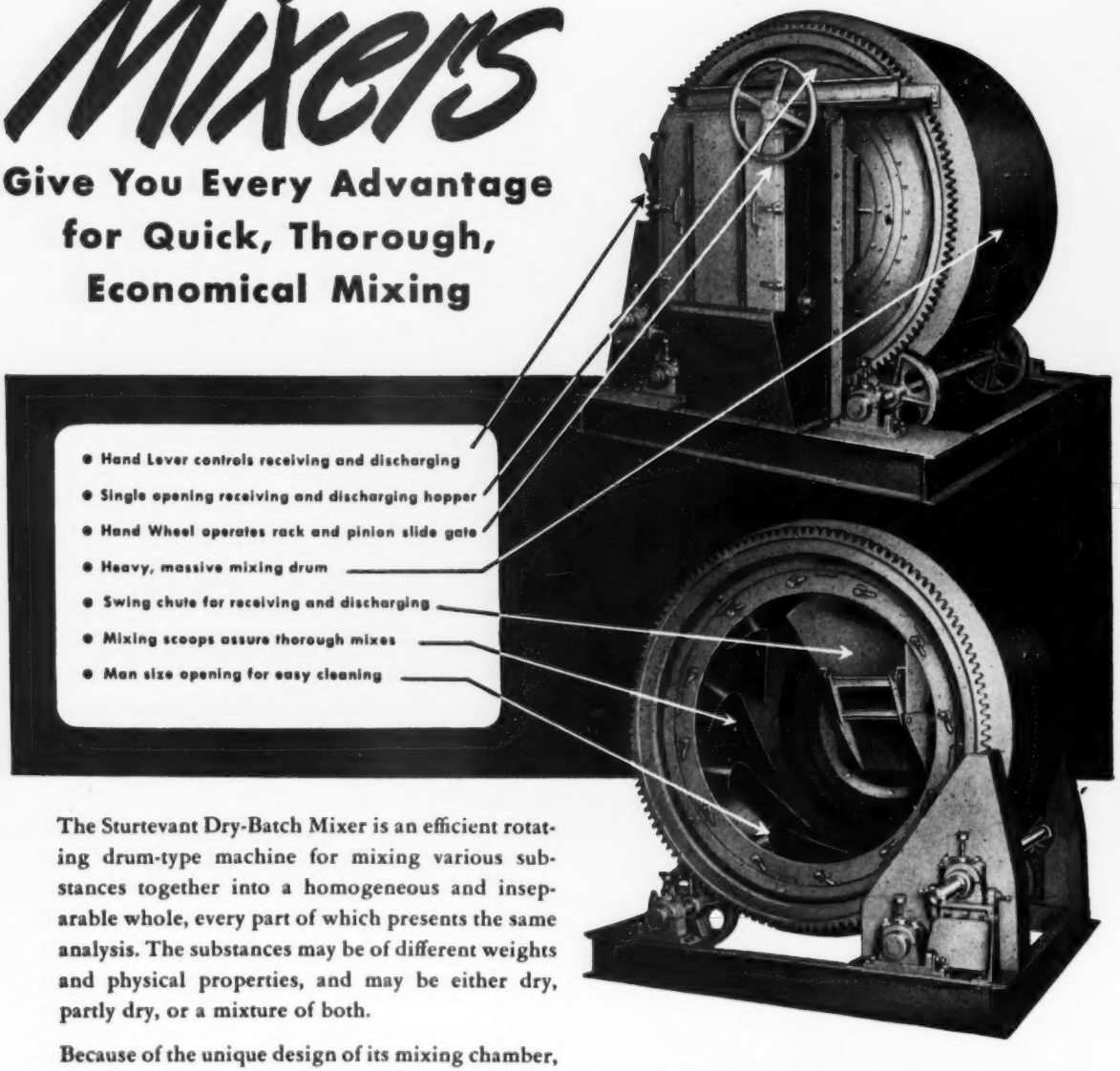
IRON MOUNTAIN MICHIGAN

Look to Lake Shore for Leadership

Sturtevant Dry Batch

Mixers

Give You Every Advantage for Quick, Thorough, Economical Mixing


• Hand Lever controls receiving and discharging
• Single opening receiving and discharging hopper
• Hand Wheel operates rack and pinion slide gate
• Heavy, massive mixing drum
• Swing chute for receiving and discharging
• Mixing scoops assure thorough mixes
• Man size opening for easy cleaning

The Sturtevant Dry-Batch Mixer is an efficient rotating drum-type machine for mixing various substances together into a homogeneous and inseparable whole, every part of which presents the same analysis. The substances may be of different weights and physical properties, and may be either dry, partly dry, or a mixture of both.

Because of the unique design of its mixing chamber, and the 4-way mixing action which brings two or more substances together, the Sturtevant Dry-Batch Mixer does a more rapid mixing job than other machines and, at the same time, it is complete and thorough in every particular.

Write for bulletin today.

Compare These Advantages

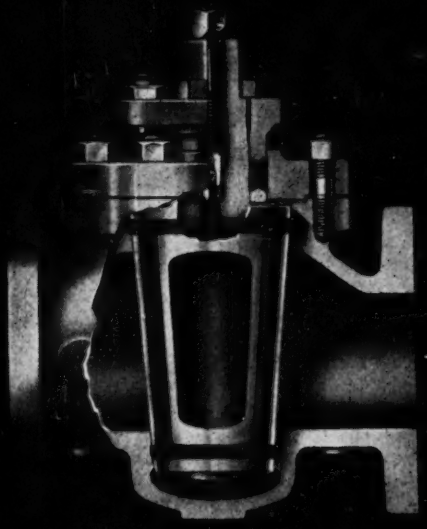
- Only one lever controls both receiving and discharging for simplicity of operation. Hand wheel operates rack and pinion slide at feed opening.
- 4-way mixing action speeds production...assures thorough blends.
- "Open-door" accessibility permits easy, fast, thorough, cleaning.
- Single aperture drum for both intake and discharge.
- Unusually efficient scoops pick up materials to effect thorough mixing as drum revolves.
- 5 models . . . a size for every mixing job . . . smallest size mixes up to 7½ tons per hour . . . largest size up to 75 tons per hour.

STURTEVANT MILL COMPANY

101 Clayton Street, Boston 22, Mass.

Designers and Manufacturers of:

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
ELEVATORS • MIXERS
MECHANICAL DENS and EXCAVATORS



LUBRICATED PLUG

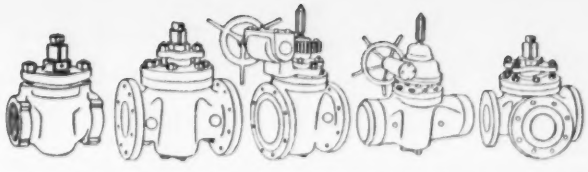
COMPLETE LINES OF LUBRICATED PLUG VALVES

Because of the wide range of services to which Lubricated Plug Valves can be adapted, they may be classed as "all-purpose" valves. Walworth manufactures complete lines of Lubricated Plug Valves in a variety of types and materials for working pressures up to 5,000 psi and for vacuum services. Sizes range from ½ to 30 inches. Write for descriptive literature.

Walworth also manufactures complete lines of gate, globe, angle, and check valves made of steel, bronze, iron, and special alloys.

Walworth valves, pipe fittings, and pipe wrenches total approximately 50,000 items and are sold through distributors all over the world.

Walworth engineers will be glad to help you with your problems. Call your local Walworth distributor, nearest Walworth sales office, or write to our General Offices, 60 East 42nd Street, New York 17, New York.



Illustrated in section is a Walworth No. 1700F Regular Gland Type, Wrench Operated, Steeliron, Lubricated Plug Valve. This particular line of valves has a working pressure rating of 200 psi at 150F or 125 psi at 450F. Sizes range from ½ to 8 inches. Other Walworth Lubricated Plug Valves include Single Gland and Ball Bearing types. They are available for a variety of working pressures.

For best results use Walworth Lubricants and Walworth High Pressure Lubricant Guns.

WALWORTH

Manufacturers since 1842

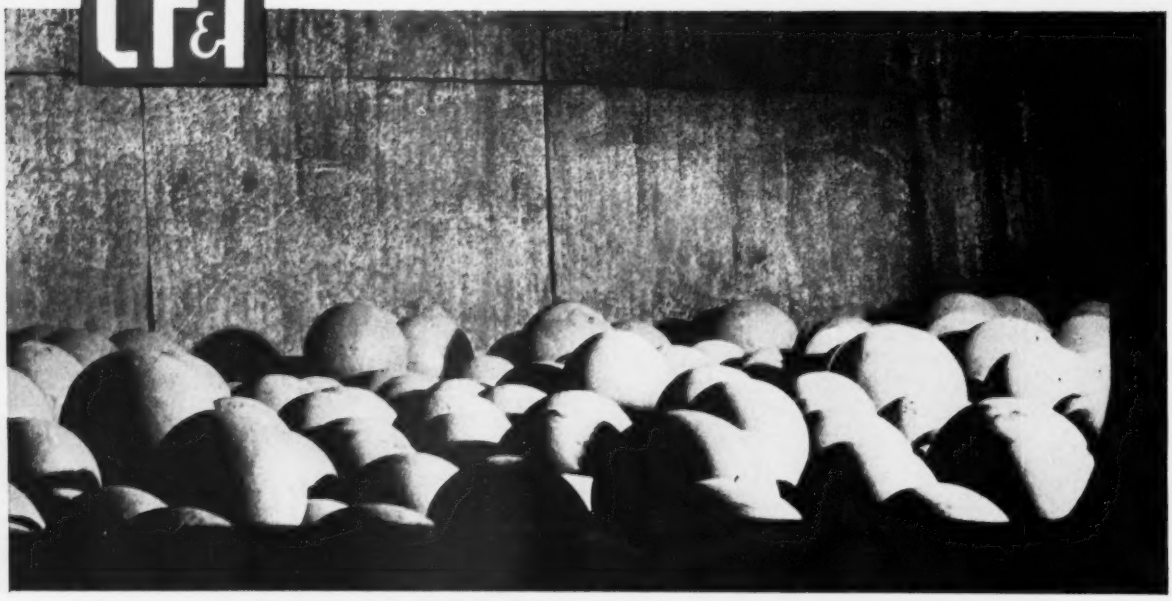
valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

CF&I

STEEL PRODUCTS FOR THE MINING INDUSTRY



FORGED STEEL GRINDING BALLS

CF&I Grinding Balls are forged from special analysis steel to impart the high impact and abrasion resistance that enables them to wear evenly and remain spherical.

The assistance of CF&I metallurgists and engineers is always available to help solve any grinding problem. Perhaps they can help you increase production or lower operating costs.

CF&I Products for the Mining Industry

Cal-Wic Wire Cloth Screens • Mine Rails and Accessories • Rock Bolts
Wickwire Rope • Grinding Balls • Grinding Rods

THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND
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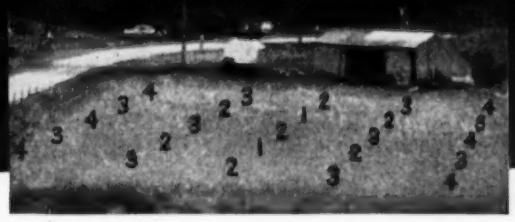
CF&I
FORGED STEEL GRINDING BALLS
THE COLORADO FUEL AND IRON CORPORATION

the inside story

Here's how ROCKMASTER® increases displacement

Final muck pile as seen from the road.



When the contractor or stripping operator says he wants a blast to produce increased displacement he means, "Well broken rock, piled up for easy digging" . . . the way it is in the large photo above. In this tight shot the rock was not thrown high, but it was thoroughly broken and dislocated from its original position.

The height of the final pile shows the increased displacement you can get with ROCKMASTER millisecond delays in an alternate pattern. When the blast is shot the first delays thoroughly stress the burden. Then at the instant of maximum stress, the next delays hit the burden with a churning action that twists and turns the rock. Without this double punch, the rock would tend to drop back into place. This would mean hard, expensive digging at the bottom of the pile even though the top rock might look well broken.

To see how you can profit by using the correct number of the sixteen ROCKMASTER millisecond delay electric blasting caps teamed with the ROCKMASTER system of explosives choice and loading methods, write for your copy of the 20-page ROCKMASTER booklet and a reprint of the paper "OVERBURDEN BLASTING TECHNIQUES."

ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

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The NEW T-H Exide-Ironclad

★ **20% more capacity in the same space**

★ **Lowest cost per A.H. to own and operate**

Heavier demands on all types of battery-powered haulage equipment dictate the need for batteries with greater capacity.

The new Exide-Ironclad T-H battery gives 20% more capacity in the same space—WITHOUT SACRIFICE OF LONG LIFE for which Exide-Ironclad Batteries are famous.

This new T-H battery is of the time-tested Exide-Ironclad construction, employing the exclusive slotted tube positive plate. New materials have made structural changes possible, which permit the use of larger positive plates—resulting in increased capacity.

The T-H line of Exide-Ironclad Batteries includes capacities for all battery-powered haulage units.

Now-more than ever before... YOUR BEST POWER BUY AT ANY PRICE!

Thrifty Hauler

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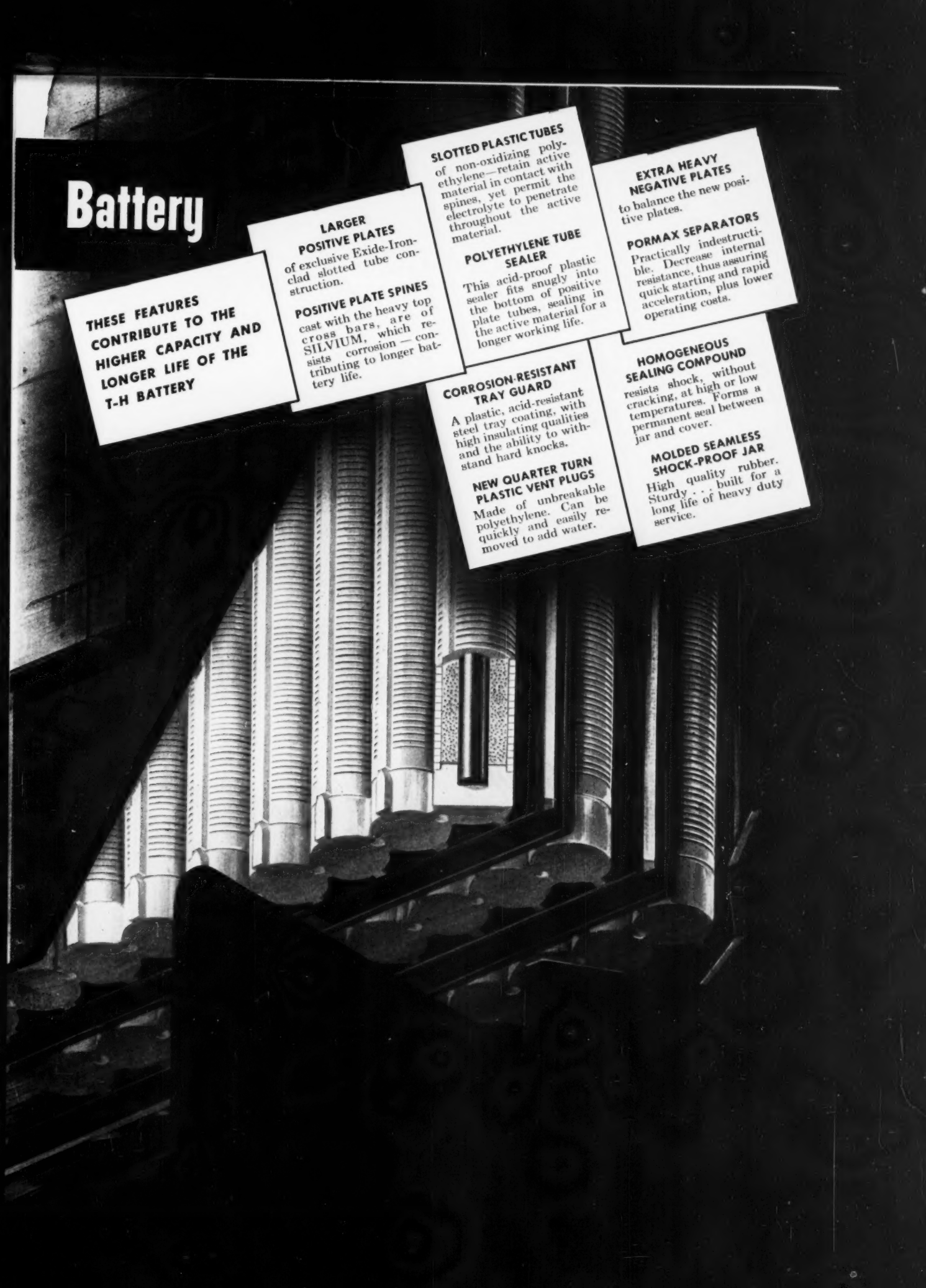
Exide Batteries of Canada, Limited, Toronto

1888—DEPENDABLE BATTERIES FOR 65 YEARS—1953

"EXIDE", "EXIDE-IRONCLAD", "SILVIUM", "FORMAX", *Reg. T.M. U.S. Pat. Off.*


Battery
THESE FEATURES CONTRIBUTE TO THE HIGHER CAPACITY AND LONGER LIFE OF THE T-H BATTERY
LARGER POSITIVE PLATES
of exclusive Exide-Ironclad slotted tube construction.
POSITIVE PLATE SPINES
cast with the heavy top cross bars, are of SILVIUM, which resists corrosion — contributing to longer battery life.
SLOTTED PLASTIC TUBES
of non-oxidizing polyethylene — retain active material in contact with spines, yet permit the electrolyte to penetrate throughout the active material.
POLYETHYLENE TUBE SEALER
This acid-proof plastic sealer fits snugly into the bottom of positive plate tubes, sealing in the active material for a longer working life.
CORROSION-RESISTANT TRAY GUARD
A plastic, acid-resistant steel tray coating, with high insulating qualities and the ability to withstand hard knocks.
NEW QUARTER TURN PLASTIC VENT PLUGS
Made of unbreakable polyethylene. Can be quickly and easily removed to add water.
EXTRA HEAVY NEGATIVE PLATES
to balance the new positive plates.
PORMAX SEPARATORS
Practically indestructible. Decrease internal resistance, thus assuring quick starting and rapid acceleration, plus lower operating costs.
HOMOGENEOUS SEALING COMPOUND
resists shock, without cracking, at high or low temperatures. Forms a permanent seal between jar and cover.
MOLDED SEAMLESS SHOCK-PROOF JAR
High quality rubber. Sturdy . . . built for a long life of heavy duty service.

...is the FAST way to

DRIVE LARGE HEADINGS

faster set-up and get-out
—with creep-free Hydraulic Drill Jumbos.

fewer steel changes
—with lightweight long feed aluminum guideshells.

fast-pace drilling
—with Automatic Continuous Feed Drifters.

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Because it stands up on the roughest jobs, G-E Geoprene portable cable is ideal for use with shovels, draglines, loaders, and other heavy portable equipment.

Its abrasion-resistant neoprene-base jacket is also resistant to most oils, acids, alkalies, sunlight, and flame. For additional strength, a tough, corded reinforcing mesh increases the cable's ability to withstand continual hauling and dragging, while the conductors themselves are rope-stranded for maximum flexibility.

In the full line of General Electric wires and cables you will find exactly the cable you need. This line includes G-E No. 1799 varnished-cambric-insulated cable, Super Coronol* cable, wire armored cable for borehole service, interlocked armor cable, aerial cable, mine telephone cable, Flamenol* control cable, and magnet wire.

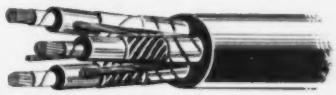
*Registered Trade-mark General Electric Company

You can put your confidence in—

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

GENERAL ELECTRIC

WIRE AND CABLE IDEAS for Metal Mining

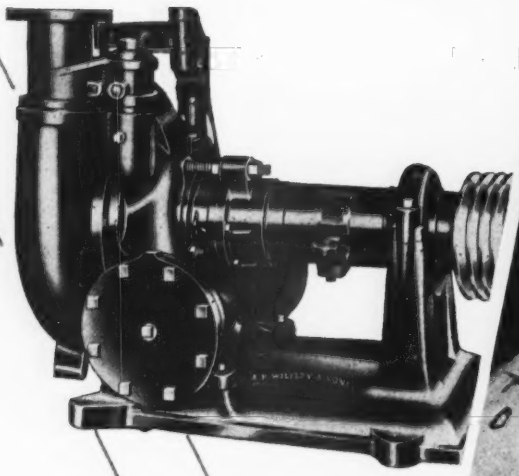


G-E mine power cable is a lightweight, high-voltage cable resistant to all the usual hazards encountered in mine operation as well as to heat, oils, acids, alkalies, sunlight, and aging. Recommended for use in haulageways, airshafts, boreholes, and for suspension from roof supports.

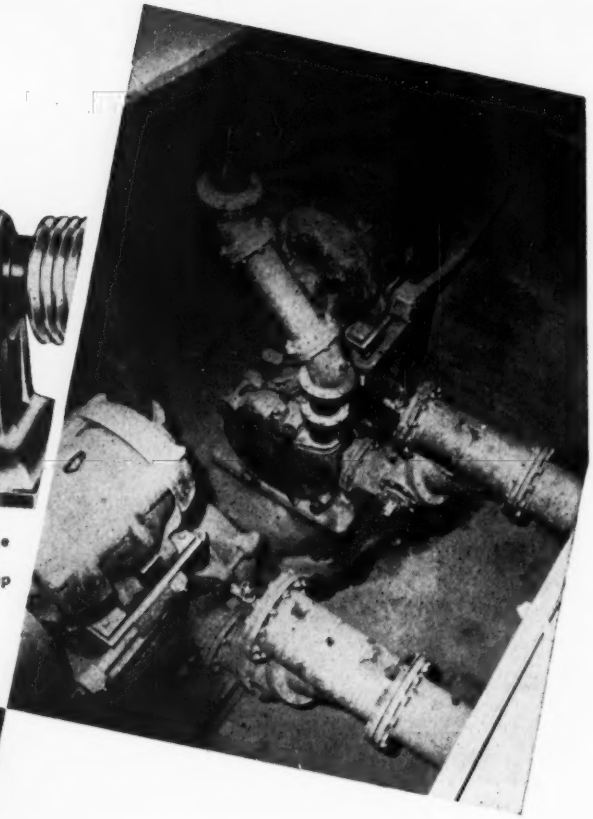
G-E Flamenol mine telephone cable is specifically designed for circuits where induced current and cross talk must be reduced to a minimum. Thermoplastic-jacketed cable is recommended to withstand the roughest usage; the plain twisted pair, without jacket, for less severe conditions.

G-E Flamenol station control cable has a thermoplastic jacket so resistant to moisture, oils, acids, alkalies, sunlight, and aging, that it is equally suitable for installations in ducts or conduits, in open air, or buried directly in the ground.

The wide line of G-E wires and cables for the Mining Industry is described, with valuable application data, in this 24-page illustrated booklet. For your copy write to Section W85-595, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.



Companion to the famous Wilfley Acid Pump



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In cement plants all over the world where slurries, sands or slimes are handled, famous WILFLEY Sand Pumps are delivering continuous, trouble-free performance 24 hours a day without attention. Wherever WILFLEYS are used, the record reveals stepped-up production and cost-saving efficiency. There is an economical WILFLEY pump size for every pumping requirement. Individual engineering on every application. Write or wire for complete details.

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WILFLEY
centrifugal PUMPS

Markets Continued on Page 106

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"Free" Gold Market

Price movements varied in free gold markets, rising in Bombay and Buenos Aires by as much as 4 to 5%, but selling off moderately in other trading centers. The volume of business increased during April by approximately 5% over March. Pick's World Currency Report quotes on "free" gold as follows, per fine oz.:

	COINS		BARS (12.5 kg.)	
	Mar. 31	April 30	Mar. 31	April 30
NEW YORK, transit	.....	.....	$37.20	$37.00
MANILA	$46.50	$45.50	38.40	36.40
HONG KONG	46.00	45.50	39.70	39.40
BOMBAY	46.25	47.15	46.25	48.75
TANGIER	47.25	46.00	37.20	37.00
BEYROUTH	45.50	45.00	37.50	37.10
PARIS	50.25	50.25	38.25	38.00
BUENOS AIRES	45.50	46.00	40.00	41.50

Note: All prices are computed at the free or black market value of the U. S. dollar in the local markets

Major Metals

U. S. DAILY AND AVERAGE PRICES

April 1953	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
1	30.300	34.750	119.000	13.500	13.300	11.000
2	29.750	34.625	116.500	13.500	13.300	11.000
3	30.050	34.775	116.500	13.500	13.300	11.000
4	No Market	33.425	116.500	13.500	13.300	11.000
6	29.700	34.450	116.500	13.500	13.300	11.000
7	29.800	34.300	111.000	13.250	12.800	11.000
8	30.425	34.200	111.500	13.000	12.800	11.000
9	30.275	33.675	109.000	13.000	12.800	11.000
10	29.825	33.525	105.000	13.000	12.800	11.000
11	No Market	34.025	105.000	13.000	12.800	11.000
13	29.825	33.125	99.500	13.000	12.800	11.000
14	30.750	33.275	98.500	13.000	12.800	11.000
15	30.400	33.675	95.000	12.500	12.300	11.000
16	29.950	32.150	98.000	12.500	12.300	11.000
17	29.725	32.850	97.500	12.500	12.300	11.000
18	No Market	33.825	97.500	12.500	12.300	11.000
20	29.750	32.125	95.000	12.000	11.800	11.000
21	29.700	33.625	94.500	12.000	11.800	11.000
22	29.700	33.825	93.500	12.000	11.800	11.000
23	29.675	31.400	92.000	12.000	11.800	11.000
24	29.675	32.325	94.000	12.000	11.800	11.000
25	No Market	30.200	94.000	12.000	11.800	11.000
27	29.700	30.350	94.000	12.000	11.800	11.000
28	29.675	30.175	96.500	12.000	11.800	11.000
29	29.675	30.175	95.000	12.500	12.300	11.000
30	29.525	29.600	94.000	12.500	12.300	11.000
AVERAGES FOR MONTH						
April	29.902	32.863	102.115	12.683	12.473	11.000
AVERAGES FOR WEEK						
April						
1	29.470	34.567	120.833	13.500	13.300	11.000
8	29.945	34.296	114.750	13.375	13.133	11.000
15	30.215	33.550	102.000	12.917	12.717	11.000
22	29.765	33.067	96.000	12.250	12.050	11.000
29	29.680	30.771	94.250	12.083	11.883	11.000
CALENDAR WEEK AVERAGES						
April						
4	29.730	34.358	118.333	13.500	13.300	11.000
11	30.005	34.029	109.667	13.125	12.883	11.000
18	30.130	33.150	97.667	12.667	12.467	11.000
25	29.700	32.250	93.833	12.000	11.800	11.000

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

April 1953	Sterling Exchange "Checks"	Silver (c) New York	Silver (c) London	Gold London	Gold (d) United States
1	281.3750	85.250	74.000 d.	248 s.	$35.00
2	281.6250	85.250	74.000 d.	248 s.	35.00
3	281.6250	85.250	Holiday	Holiday	35.00
4	(e)	(e)	(e)	(e)	35.00
6	281.6250	85.250	Holiday	Holiday	35.00
7	281.6250	85.250	74.000 d.	248 s.	35.00
8	281.6250	85.250	74.000 d.	248 s.	35.00
9	281.6250	85.250	74.000 d.	248 s.	35.00
10	281.6250	85.250	74.000 d.	248 s.	35.00
11	(e)	(e)	(e)	(e)	35.00
13	281.6250	85.250	74.000 d.	248 s.	35.00
14	281.6250	85.250	74.000 d.	248 s.	35.00
15	281.6250	85.250	74.000 d.	248 s.	35.00
16	281.6875	85.250	74.000 d.	248 s.	35.00
17	281.6875	85.250	74.000 d.	248 s.	35.00
18	(e)	(e)	(e)	(e)	35.00
20	281.7500	85.250	74.000 d.	248 s.	35.00
21	281.6875	85.250	74.000 d.	248 s.	35.00
22	281.6875	85.250	74.000 d.	248 s.	35.00
23	281.7500	85.250	74.000 d.	248 s.	35.00
24	281.8125	85.250	74.000 d.	248 s.	35.00
25	(e)	(e)	(e)	(e)	35.00
27	281.8750	85.250	74.000 d.	248 s.	35.00
28	281.7500	85.250	74.000 d.	248 s.	35.00
29	281.8125	85.250	74.000 d.	248 s.	35.00
30	281.8750	85.250	74.000 d.	248 s.	35.00
AVERAGES FOR MONTH					
April	281.682	85.250	74.000 d.	—	35.00
AVERAGES FOR WEEK					
April					
1	281.500	85.250	—	—	—
8	281.625	85.250	—	—	—
15	281.625	85.250	—	—	—
22	281.700	85.250	—	—	—
29	281.800	85.250	—	—	—

Calendar Week Averages, New York Silver: April 4th, 85.250; 11th, 85.250; 18th, 85.250; 25th, 85.250.

(e) No Market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotations for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

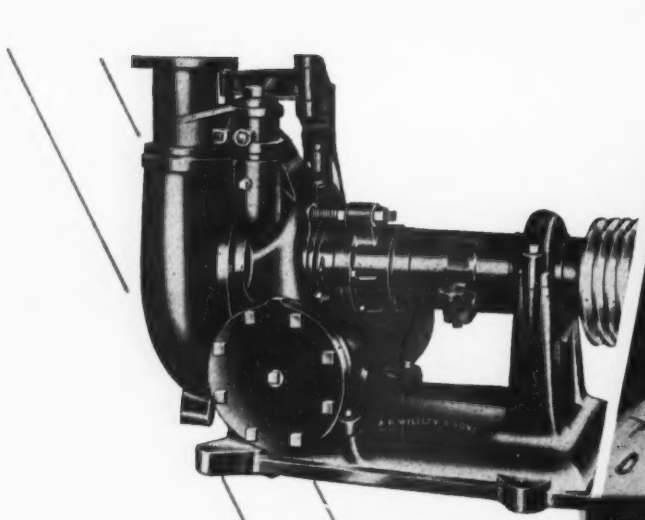
Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered, in the East, Middle West, and West, effective Jan. 1, 1951, commanded a premium of 1.35c. per pound over the current market for Prime Western; Special High Grade 1.50c.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

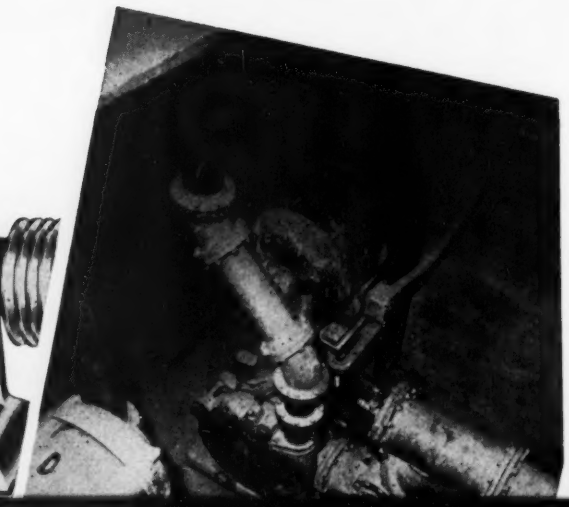
(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, as reported daily by regular suppliers, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at .99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.



Companion to the famous Wilfley Acid Pump



Cement Slurry

PAGE MIS

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Individual engineering on every application.
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Markets Continued on Page 106

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BOMBAY	46.25	47.15	46.25	48.75
TANGIER	47.25	46.00	37.20	37.00
BEYROUTH	45.50	45.00	37.50	37.10
PARIS	50.25	50.25	38.25	38.00
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Note: All prices are computed at the free or black market value of the U. S. dollar in the local markets

UNNUMBERED

and Sterling
AILY AND AVERAGE PRICES

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			(c) New York	London	London	(d) United States
			85.250	74.000 d.	248 s.	$35.00
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			85.250	Holiday	Holiday	35.00
			(e)	(e)	(e)	35.00
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AVERAGES FOR MONTH						
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AVERAGES FOR WEEK						
			85.250	—	—	—
			85.250	—	—	—
15	30.215	33.550	162.000	12.917	12.717	11.000	15	281.625	85.250	—	—	—
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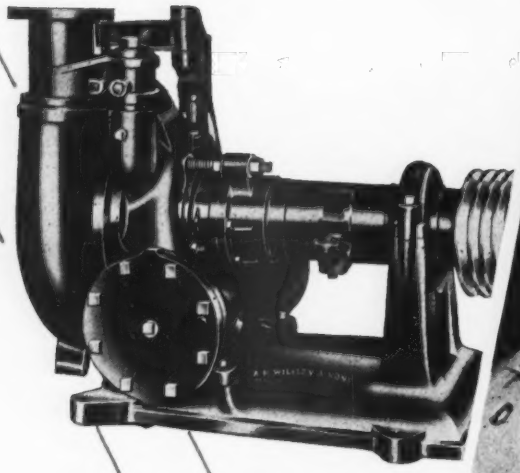
(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, as reported daily by regular suppliers, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at .99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.



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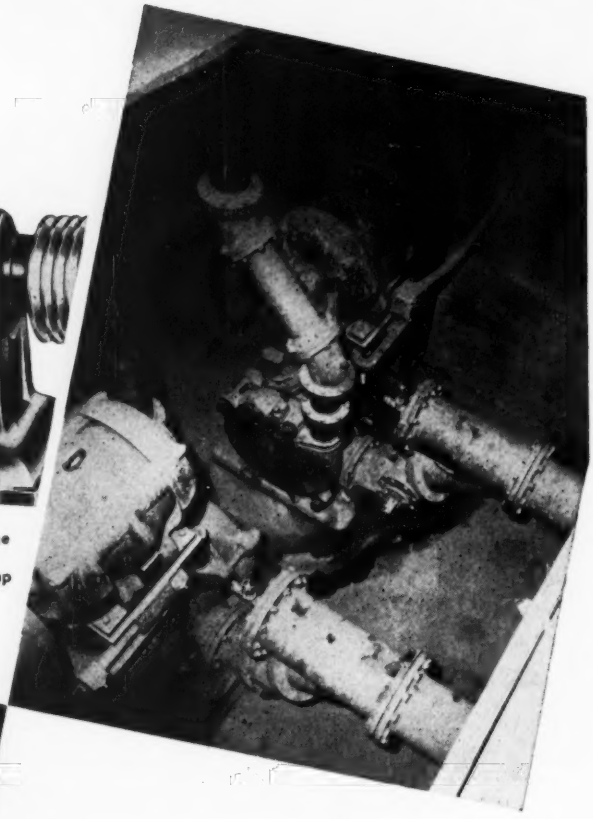

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Markets Continued on Page 106

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Zinc dropped to the equivalent of a shade below 8¢ per pound in London. Despite this weakness, smelters here saw no good in lowering the price below the 11¢ basis established early in March. The decline in London was viewed as excessive. Low prices are bringing about curtailment in production and it is hoped that a reasonable balance between supply and demand can be attained before long.

"Free" Gold Market

Price movements varied in free gold markets, rising in Bombay and Buenos Aires by as much as 4 to 5%, but selling off moderately in other trading centers. The volume of business increased during April by approximately 5% over March. Pick's World Currency Report quotes on "free" gold as follows, per fine oz.:

	COINS		BARS (12.5 kg.)	
	Mar. 31	April 30	Mar. 31	April 30
NEW YORK, transit	.....	.....	$37.20	$37.00
MANILA	$46.50	$45.50	38.40	36.40
HONG KONG	46.00	45.50	39.70	39.40
BOMBAY	46.25	47.15	46.25	48.75
TANGIER	47.25	46.00	37.20	37.00
BEYROUTH	45.50	45.00	37.50	37.10
PARIS	50.25	50.25	38.25	38.00
BUENOS AIRES	45.50	46.00	40.00	41.50

Note: All prices are computed at the free or black market value of the U. S. dollar in the local markets

Major Metals

U. S. DAILY AND AVERAGE PRICES

April 1953	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
1	30.300	34.750	119.000	13.500	13.300	11.000
2	29.750	34.625	116.500	13.500	13.300	11.000
3	30.050	34.775	116.500	13.500	13.300	11.000
4	No Market	33.425	116.500	13.500	13.300	11.000
6	29.700	34.450	116.500	13.500	13.300	11.000
7	29.800	34.300	111.000	13.250	12.800	11.000
8	30.425	34.200	111.500	13.000	12.800	11.000
9	30.275	33.675	109.000	13.000	12.800	11.000
10	29.825	33.525	105.000	13.000	12.800	11.000
11	No Market	34.025	105.000	13.000	12.800	11.000
13	29.825	33.125	99.500	13.000	12.800	11.000
14	30.750	33.275	98.500	13.000	12.800	11.000
15	30.400	33.675	95.000	12.500	12.300	11.000
16	29.950	32.150	98.000	12.500	12.300	11.000
17	29.725	32.850	97.500	12.500	12.300	11.000
18	No Market	33.825	97.500	12.500	12.300	11.000
20	29.750	32.125	95.000	12.000	11.800	11.000
21	29.700	33.625	94.500	12.000	11.800	11.000
22	29.700	33.825	93.500	12.000	11.800	11.000
23	29.675	31.400	92.000	12.000	11.800	11.000
24	29.675	32.325	94.000	12.000	11.800	11.000
25	No Market	30.200	94.000	12.000	11.800	11.000
27	29.700	30.350	94.000	12.000	11.800	11.000
28	29.675	30.175	96.500	12.000	11.800	11.000
29	29.675	30.175	95.000	12.500	12.300	11.000
30	29.525	29.600	94.000	12.500	12.300	11.000
AVERAGES FOR MONTH						
April	29.902	32.863	102.115	12.683	12.473	11.000
AVERAGES FOR WEEK						
April						
1	29.470	34.567	120.833	13.500	13.300	11.000
8	29.945	34.296	114.750	13.375	13.133	11.000
15	30.215	33.550	102.000	12.917	12.717	11.000
22	29.765	33.067	96.000	12.250	12.050	11.000
29	29.680	30.771	94.250	12.083	11.883	11.000
CALENDAR WEEK AVERAGES						
April						
4	29.730	34.358	118.333	13.500	13.300	11.000
11	30.005	34.029	109.667	13.125	12.883	11.000
18	30.130	33.150	97.667	12.667	12.467	11.000
25	29.700	32.250	93.833	12.000	11.800	11.000

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

April 1953	Sterling Exchange "Checks"	Silver (c) New York	Silver (c) London	Gold London	Gold (d) United States
1	281.3750	85.250	74.000 d.	248 s.	$35.00
2	281.6250	85.250	74.000 d.	248 s.	35.00
3	281.6250	85.250	Holiday	Holiday	35.00
4	(e)	(e)	(e)	(e)	35.00
6	281.6250	85.250	Holiday	Holiday	35.00
7	281.6250	85.250	74.000 d.	248 s.	35.00
8	281.6250	85.250	74.000 d.	248 s.	35.00
9	281.6250	85.250	74.000 d.	248 s.	35.00
10	281.6250	85.250	74.000 d.	248 s.	35.00
11	(e)	(e)	(e)	(e)	35.00
13	281.6250	85.250	74.000 d.	248 s.	35.00
14	281.6250	85.250	74.000 d.	248 s.	35.00
15	281.6250	85.250	74.000 d.	248 s.	35.00
16	281.6875	85.250	74.000 d.	248 s.	35.00
17	281.6875	85.250	74.000 d.	248 s.	35.00
18	(e)	(e)	(e)	(e)	35.00
20	281.7500	85.250	74.000 d.	248 s.	35.00
21	281.6875	85.250	74.000 d.	248 s.	35.00
22	281.6875	85.250	74.000 d.	248 s.	35.00
23	281.7500	85.250	74.000 d.	248 s.	35.00
24	281.8125	85.250	74.000 d.	248 s.	35.00
25	(e)	(e)	(e)	(e)	35.00
27	281.8750	85.250	74.000 d.	248 s.	35.00
28	281.7500	85.250	74.000 d.	248 s.	35.00
29	281.8125	85.250	74.000 d.	248 s.	35.00
30	281.8750	85.250	74.000 d.	248 s.	35.00
AVERAGES FOR MONTH					
April	281.682	85.250	74.000 d.	—	35.00
AVERAGES FOR WEEK					
April					
1	281.500	85.250	—	—	—
8	281.625	85.250	—	—	—
15	281.625	85.250	—	—	—
22	281.700	85.250	—	—	—
29	281.800	85.250	—	—	—

Calendar Week Averages, New York Silver: April 4th, 85.250; 11th, 85.250; 18th, 85.250; 25th, 85.250.

(e) No Market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotations for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered, in the East, Middle West, and West, effective Jan. 1, 1951, commanded a premium of 1.35c. per pound over the current market for Prime Western; Special High Grade 1.50c.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

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The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at .99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

MARKETS—Trends and Prices

Price Unsettlement in Metals Continues—Foreign Copper in "Free" Market Nears 30c.

UNCERTAINTY OVER KOREAN and other major political developments continued throughout April, which cast a shadow over virtually all commodity markets. The trend in prices, particularly abroad, was downward, indicating that the supply situation is easing materially. With less emphasis on production for war, most observers believe that a buyer's market will prevail for some time to come.

Despite unsettlement in nonferrous metal prices, actual use of copper, lead and zinc in the first four months in this country continued at a high level. General industrial activity, as measured by the Federal Reserve, rose to 242% of the 1935-39 average during March, and a preliminary estimate for April points to a rate equally as high. This compares with 216% a year ago.

Most of the selling pressure on prices originated in the U.K. and on the Continent. Inability to move metals freely caused sellers to hedge on the London Metal Exchange. However, the option market was too thin to absorb this selling and prices dropped to new lows for the movement. Prompt lead settled at £78 15s. per long ton, a loss of £8 for the month; zinc settled at £67 5s., a loss of £9 11s.3d. Tin had a great fall, declining from £930 to £715 in a period of 30 days.

Metals Index Declines

Though our monthly average for domestic copper advanced moderately, lower averages for lead, zinc and tin caused the *E&MJ* index of nonferrous metal prices to decline from 184.44 in March to 182.61 in April. Aluminum continued to enjoy a stable market at all times, with producers pushing for some relaxation in the government's stockpile program for the second half of the year.

The decline in lead and zinc prices has intensified the drive on the part of domestic mine operators for added tariff protection. The proposed sliding scale tax encountered opposition from custom smelters in need of foreign concentrates, and important consumers. The fact that the industry was divided on the plan made it extremely doubtful whether any action on the controversial subject will be taken at this session of Congress. Consumers fear that the plan will result in an uneconomic price for zinc that would in the end divert business to aluminum and magnesium, particularly in die casting. As the month ended the proponents of the measure were engaged in rewriting the section of the bill containing the lead and zinc provisions to make it more acceptable. The measure, as it stands, retains the regular duty and adds 1¢ per pound for each 1¢ drop from a base of 15½¢ per pound.

Foreign Copper Unsettled

The free market for foreign copper, which would exclude Chilean metal controlled by the Chilean Government, has been in process of moving down to approximately the 30¢ level established in the United States. This was viewed as a favorable development, pointing to a return to a single pricing standard. As the month ended, foreign copper was available in a large way at prices varying between 29¢ and 31¢ per pound, f.a.s. N. Y. equivalent.

Chile continued to hold to 35½¢, f.o.b. Chilean ports. So far, Chile has disposed of its current production.

In the free market, producers and custom smelters have been unable to sell foreign copper at higher than the 30¢ level.

The British Ministry of Materials entered into a new agreement with Commonwealth producers under which the British will obtain copper, in quantity, on the basis of the market price prevailing in the United States (*E&MJ* domestic quotation).

These developments caused widespread criticism of our daily average price of foreign copper that, until recently, included the arbitrary selling basis fixed by the Chilean Government. During the last week of April, in a thin market, the "sales" reported by the Chilean producers would have resulted in averages of 35¢ and higher, which, in our opinion, would have been unfair to a large segment of the foreign market (Rhodesia, Belgian Congo, and Canada) willing to take on business at 30¢.

Moreover, independent consumers who purchased Chilean copper at the higher level, with an exception here and there, also obtained domestic copper at 30¢, with the bulk of their take consisting of the lower-priced metal. In other words, consumers who were free agents in purchasing copper did not pay the top price on their requirements. In fact, fabricators in this country have been pricing their products on the basis of a shade above 32¢ per pound.

Beginning with April 23, we have excluded Chilean copper from our calculations in arriving at a free market price for foreign copper. The Chilean copper, priced at 36½¢ delivered Valley, was from 5½¢ to 6½¢ higher than the price named by other producers.

Demand for copper in the domestic trade was fairly active. Buyers were interested chiefly in April and May metal. So far as June forward copper was concerned, business was quiet and prices unsettled.

During the first quarter of the year, U. S. fabricators shipped products that contained 383,477 tons of copper, which is at the rate of 1,533,908 tons a year. Authorities on copper do not expect the annual rate to move up to this level.

Lead in Demand

Consumption of lead in the United States was generally described as excellent. Purchases were spasmodic, varying with the trend in prices in London. Nevertheless, the total volume of lead booked by producers was satisfactory. The price declined from 13½¢ to 12¢, but moved up to 12½¢ shortly

Average Prices for April (E&MJ Quotations)

Copper:	
Electrolytic, domestic, refinery	29.902
Electrolytic, export, refinery ..	32.863
Lead:	
Common, New York	12.683
Common, St. Louis	12.473
Silver and Sterling Exchange:	
Silver, New York, per oz.	85.250
Silver, London, pence per oz. ..	74.000
Sterling Exchange, "Checks"	281.682
Zinc:	
Prime Western East St. Louis	11.000
Tin:	
New York Straits	102.115
New York, 99% min. ....(e)	101.115
Gold, per oz. U.S. price	$35.000
Quicksilver, per flask	$195.885
Antimony (E&MJ) (d)	37.970
Antimony, bulk, Laredo	34.500
Antimony, in cases, Laredo .	35.000
Platinum, refined, per oz. ..	90.000
Cadmium (a)	200.000
Cadmium (b)	207.500
Cadmium (c)	215.000
Aluminum, 99% plus, ingot .	20.500
Magnesium, ingot	27.000
Nickel (f)	60.000

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lbs.
(a) Cadmium average based on the producers' quotations.
(b) Cadmium average based on the average of the producers' and platers' quotation.
(c) Cadmium average based on platers' quotation.
(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.
(e) Tin content.
(f) F.o.b. Port Colborne, U.S. duty included.

Markets Continued on Page 106

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"Free" Gold Market

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BEYROUTH	45.50	45.00	37.50	37.10
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Note: All prices are computed at the free or black market value of the U. S. dollar in the local markets

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25	29.700	32.250	93.833	12.000	11.800	11.000

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

April 1953	Sterling Exchange "Checks"	Silver (c) New York	Silver (c) London	Gold London	Gold (d) United States
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23	281.7500	85.250	74.000 d.	248 s.	35.00
24	281.8125	85.250	74.000 d.	248 s.	35.00
25	(e)	(e)	(e)	(e)	35.00
27	281.8750	85.250	74.000 d.	248 s.	35.00
28	281.7500	85.250	74.000 d.	248 s.	35.00
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22	281.700	85.250	—	—	—
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(b) Our export quotations for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered, in the East, Middle West, and West, effective Jan. 1, 1951, commanded a premium of 1.35c. per pound over the current market for Prime Western; Special High Grade 1.50c.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, as reported daily by regular suppliers, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold is at .99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

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Common, St. Louis	12.473
Silver and Sterling Exchange:	
Silver, New York, per oz.	85.250
Silver, London, pence per oz. ..	74.000
Sterling Exchange, "Checks"	281.682
Zinc:	
Prime Western East St. Louis	11.000
Tin:	
New York Straits	102.115
New York, 99% min. ....(e)	101.115
Gold, per oz. U.S. price	....$35.000
Quicksilver, per flask	....$195.885
Antimony (E&MJ) (d)	37.970
Antimony, bulk, Laredo	34.500
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For example, do you think the problem of ridding unions of Communist domination should be left wholly up to government? Before you answer, consider for a moment who else might logically be held responsible for a solution.

The public can help if its opinion is aroused and focused on the problem. Through its various organizations and media of voicing opinion, the public can force any or all of the other interested groups to take effective action against Communist influence. The public does not, however, have a responsibility to take such action on its own.

Government obviously can act, and in an emergency, through the FBI, it would act swiftly and effectively. Many, therefore, believe that government should be the sole active agent in getting rid of Communistic union leadership.

It must be recognized, however, that government intervention in labor relations can work both ways. If you welcome the aid of government in driving from your local union's leadership a man whose economic views you regard as dangerous and disloyal, what is to prevent some future administration, having swung, let us say, far over to the left, from helping your local union drive *you* from your job because the union considers your views dangerously oppressive and hopelessly capitalistic?

The more you ask the national government to do, the more you will eventually find it willing, even eager, to do.

The mining industry, quite properly, opposes nation-wide bargaining and other adjustment of labor disputes on a national basis. Even on Communism, it seems better to keep control of local affairs in local hands.

Unions can do the best job of ousting Communists. That is, they can do it with the least repercussions of ill-will and distrust. They *have* done it, where the rank and file has become convinced that their leaders were putting Moscow's line ahead of local interests.

No union will toss out a hard-working, capable, union leader just because someone outside the union says he's a Communist.

As Mr. Kuzell pointed out in his recent appearance before Congressional committees, the CIO disfranchised the Mine, Mill union because its Communist dominance made it a threat to the CIO leadership, not because it threatened the nation's security (although it obviously is such a threat).

Industrial management, then, is the last hope, but with good reason management is reluctant to force an issue that might disrupt labor relations and close down plants.

"My job," a top official may tell you, "is to keep this company operating at a profit. Our charter empowers us to raise money, to spend it producing certain goods, and to sell those goods at a price high enough to cover our costs, our taxes, various other charges, and reasonable dividends to our stockholders. There's nothing in there about uprooting Communism. That's Washington's job."

Is it, after all? Don't forget that those Communists are the sworn enemies of the system that permits management to earn those profits, and that their power to upset that system is none the less real because their Soviet masters haven't yet given them the signal to use it.

Doesn't management owe part of its efforts, even part of its profits to a defense of the system that made those profits possible? No management would answer "No" to that question. Most would probably answer, "Yes, but what *can* we do?"

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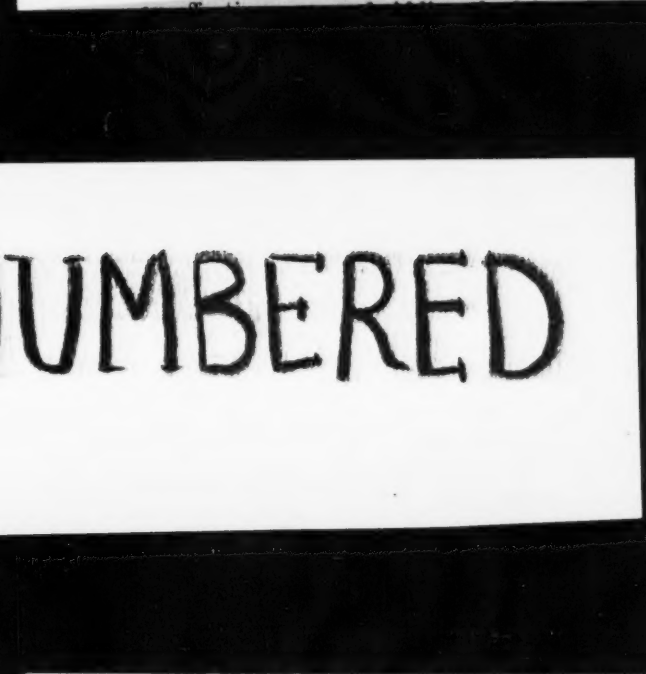

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Industrial management, then, is the last hope, but with good reason management is reluctant to force an issue that might disrupt labor relations and close down plants.

"My job," a top official may tell you, "is to keep this company operating at a profit. Our charter empowers us to raise money, to spend it producing certain goods, and to sell those goods at a price high enough to cover our costs, our taxes, various other charges, and reasonable dividends to our stockholders. There's nothing in there about uprooting Communism. That's Washington's job."

Is it, after all? Don't forget that those Communists are the sworn enemies of the system that permits management to earn those profits, and that their power to upset that system is none the less real because their Soviet masters haven't yet given them the signal to use it.

Doesn't management owe part of its efforts, even part of its profits to a defense of the system that made those profits possible? No management would answer "No" to that question. Most would probably answer, "Yes, but what *can* we do?"

We are not going to detail a program here because anything we were to say could, and would, be taken up by the Communist mouthpieces in Mine, Mill and twisted into the most sinister imputations of management's motives.

All we can say is that we firmly believe there are things management can do to thwart the Communists' grip on labor in metal mining. They are not measures that will produce results immediately, but they would be as effective as abrupt action, and would leave a better taste.

In fairness to itself and to the profit system, mining management might well study such means as are available and plan carefully to use them.

TABLE I. Active and Potential Uranium Producers in South Africa

Mining Company	Approximate Probable Monthly Capacity of Uranium Plant	Start of Production
1 Daggafontein (A)	70,000	Early 1953
2 Vogelstruisbult	40,000	Mid 1954
3 Luipaardsvlei	40,000	1954
4 West Rand Consolidated (A)	40,000	1952
5 Randfontein (A)	100,000	1954
6 Blyvooruitzicht	160,000	Early 1953
7 Stilfontein (A)	60,000	1953
8 Western Reefs (A)	140,000	Early 1953
9 Welkom	100,000	1954
10 Western Holdings		
11 Free State Geduld		
12 President Steyn	100,000	1955
13 President Brand		
14 Virginia (A)	50,000	1955
15 Harmony	45,000	1955

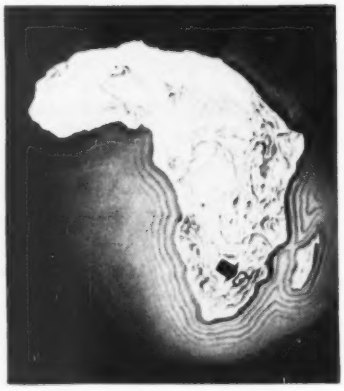
Companies marked with an (A) are or will be equipped with a sulphuric acid plant.

Other companies calling for reference are: West Driefontein (16). Erection of a plant now deferred; Merriespruit (17); Doornfontein (18); Vaal Reefs (19); St. Helena (20); Freddies North (21); Freddies South (22); Loraine (23); Jeannet (24); and Sub Nigel (25).

Uranium Soars to Prominence In South Africa's Gold Fields

THE RAPID DEVELOPMENT of the uranium industry upon the Witwatersrand goldfield of the Transvaal and Orange Free State has necessarily been cloaked in considerable mystery—and as elsewhere, secrecy has been imposed by government on many aspects of the projects now under way. Nevertheless, abiding by the restrictions imposed, one can report that the picture is indeed an impressive one. Tributes paid by the U. S. Atomic Energy Commissioner Keith Glennan last year to the rapidity of technical progress and construction work achieved in a few years were genuine, appropriate, and appreciated by the industry in this area.

Prime Minister Malan has stated that the capital cost of the present program for production of uranium is likely to exceed £40-million. This expenditure includes presumably the £7-million loan from the Export-Import Bank to the South African Electricity Supply Commission for extensions of electrical generating and distributing plant necessitated by the industrial expansion. This figure must also include the cost of plants installed or under construction for manufacture of sulphuric acid.



NEW SOURCE OF URANIUM—South Africa's Transvaal and Orange Free State.

A reasonable deduction from data available is that in 1955/56 substantially more than 10-million tons of slime residue, mostly from current gold production works and partly from residue accumulations will be subjected annually to treatment for uranium oxide. This tonnage will be dealt with by 11 leach plants serving 14 mining companies.

Of this 10-million tons, about 8-million tons will have been primarily for gold with uranium as a so-called by-product, and about 2-million tons will represent low-grade ore, of which the uranium content may be as valuable as the gold, if not actually the primary economic product.

An analysis of company projects, based largely on assumption where official studies are lacking, is presented above, with a claim for reasonable accuracy in the aggregate rather than in every item. The mines are given in geographical sequence from the East Rand to the southern extremity of the Orange Free State goldfield, a distance of more than 200 mi. (See Table I).

Expenditures scheduled or incurred upon each mine vary from £1,-

600,000 for the uranium recovery plant and laboratories at West Rand Consolidated to the bigger outlay on Western Reefs of £4,900,000; on Daggafontein of £3,900,000, and on Randfontein of £3,800,000. The last three expenditures include cost of an acid plant. The big installation at Blyvooruitzicht without acid plant is estimated at £3,400,000.

All amounts are advanced on loan, and companies have informed shareholders that the price payable for uranium produced will be related to cost on a basis which will ensure redemption of the capital cost of the plant and auxiliary expenditure, together with interest over the 10-year period of production covered by agreements. This basis, it is claimed, should provide in addition a reasonable margin of profit on the operations contemplated.

The wording of statements is standard, but the effects of implementing these provisions upon the financial affairs of individual companies will vary widely. Some mines may experience a relatively small improvement in dividend distributions and others may benefit by a strengthening of mineral resources and appreciable extension of profitable life. Good rewards would be well justified. The strain imposed upon material and human resources has been particularly severe in a country sorely overtaxing its strength to create too many gold mines in too short a time. What the rewards may be—and it is here that the stock market is found to complain most bitterly— have only been indicated in a few instances.

Geologic Distribution of Uranium

Since 1949 a special unit of the South African Geological Survey has been working for the Atomic Energy Board upon the problem of uranium distribution within the auriferous beds of the Witwatersrand system. Particular attention has been paid by this unit to the Klerksdorp and Orange Free State areas. Radioactivity bore-hole logging has been employed. General consistency has been established within this region, and auriferous reefs of economic significance have given curves differing conspicuously from those recorded against conglomerates poor in gold. Some daring correlations have been claimed.

The western and southwestern region comprising the new goldfields were employed for these investigations largely because upon the older Rand, stretching from Nigel to Randfontein, there was no diamond drilling in progress and no deep boreholes available for survey. When viewing the position over a wider area, however, irregularities of distribution appear to the nonspecialist to be more remarkable than the uniformity disclosed within the field covered by the geological unit.

The various reef horizons of widely varying economic importance—which are worked in different sections of the Witwatersrand are shown in Table II. The importance of different reefs as potential producers of uranium can only be deduced from the decisions taken by the Atomic Energy Board and mining companies. (See Table II, p. 75.)

Only one brief description of the mineralogical features has appeared to date, recording that the uranium occurs as a mixture of hydrocarbon and pitchblende or uraninite or both, to which the name of "thucolite" was given in 1928. It is a uranium-bearing variety of the so-called "carbon," well known upon the Rand, occurring in flecks, streaks and impregnations in the matrix and as a replacement of both matrix and pebbles of the conglomerates. The thorium content of these radioactive hydrocarbons is low.

Mining Company Activities

Although the terms of the agreement entered into are top secret, it is clear that direct and indirect benefits accruing from uranium production on different mines will show wide divergencies. We see, on the one hand, the great Randfontein mine destined to be given a new lease on life through uranium revenue, while the rich Blyvooruitzicht mine will gain a comparitively small benefit from the profit increase after the government has taken its heavy toll in taxation and lease consideration.

That uranium profits are to be taxed on the same basis as gold is a grievance against the government which the President of the Chamber of Mines did not hesitate to ventilate when entertaining the Prime Minister at the opening of the first uranium plant, in October 1952. But the government has cleverly sugared the pill. Loan capital expenditures on uranium which do not represent a liability against gold production, are being allowed currently to rank for amortization in the calculations of gold profits subject to taxation.

Outstanding features in the program of individual mines can be summarized as follows:

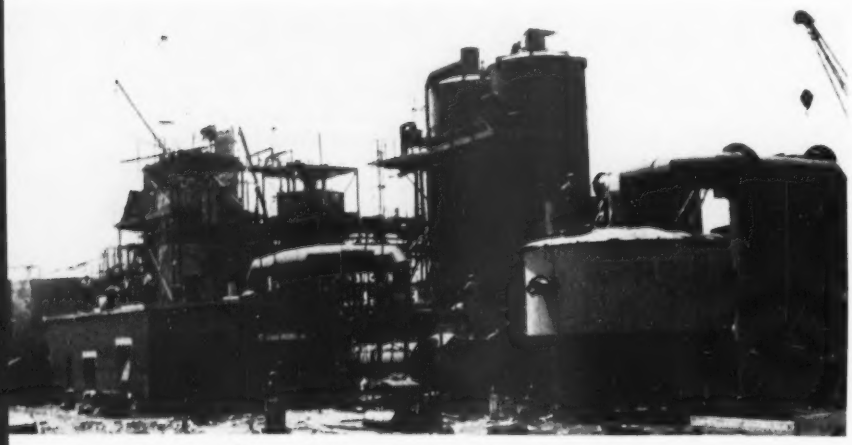
Daggafontein Mines. Formed originally to work only Main Reef. This prosperous company has been actively exploiting the overlying Kimberley Reefs for gold for several years and has an ore reserve thereon of 5½-million tons. A gold reduction plant of 750,000 tons of annual capacity was decided upon to serve this reef before the significance of its uranium content was realized. Uranium extraction and sulphuric acid plants are being added to this unit. In 1951, the company announced that annual net profits from uranium would be of the order of £133,000 but owing to revision of scheme, the estimated profit is now likely to be greater.

Vogelstruisbult. Neighboring mine is Daggafontein and now also working Kimberley Reef profitably for gold. This was added to the list of uranium producers in September last. Mill capacity is being increased to 120,000 tons per month, and it is assumed that about a third of this will serve the Kimberley Reef for gold and uranium.

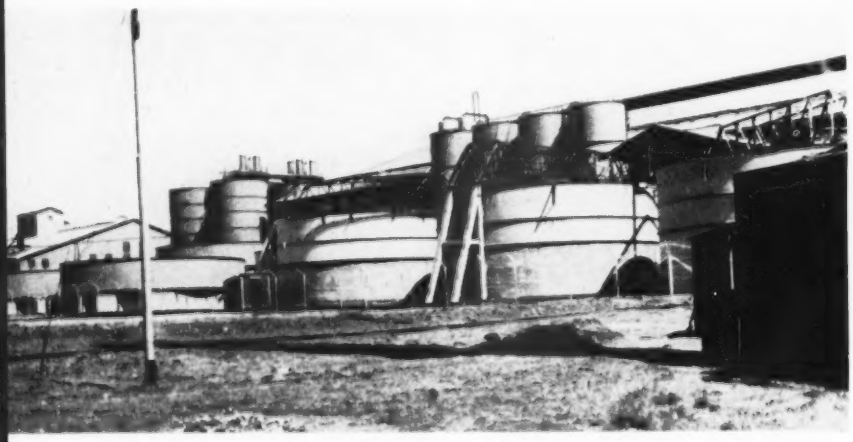
Luipaardsvlei. This is the nearest uranium property to Daggafontein and Vogelstruisbult, but there is the puzzling gap of 50 miles between them representing the richest section of the Rand goldfield from which section 430-million oz. of gold has been won since 1887. On this mine, stoping policy will be drastically affected by the call for uranium production. Diamond drilling and exploratory development on the Bird Reefs, at least one of which is highly uraniferous, has shown poor gold values. The company reports that substituting one third of the mill tonnage for ore from this new source, some decline in annual output of gold will occur, but the resultant reduction in revenue from gold will be more than offset by the revenue from sales of uranium.

West Rand Consolidated. On this pioneer uranium producer, the Monarch and perhaps the White Reef are supplying the new gold reduction works with 40,000 tons a month for the supplementary service of the uranium plant with residue slime. Some 1,200,000 tons of ore were developed on these reefs when a start was made. The sulphuric acid plant at this mine is also well served. Some of the orebodies are characterized by an exceptional quantity of iron pyrites, which has been recovered in the mill and sold to the African Ex-

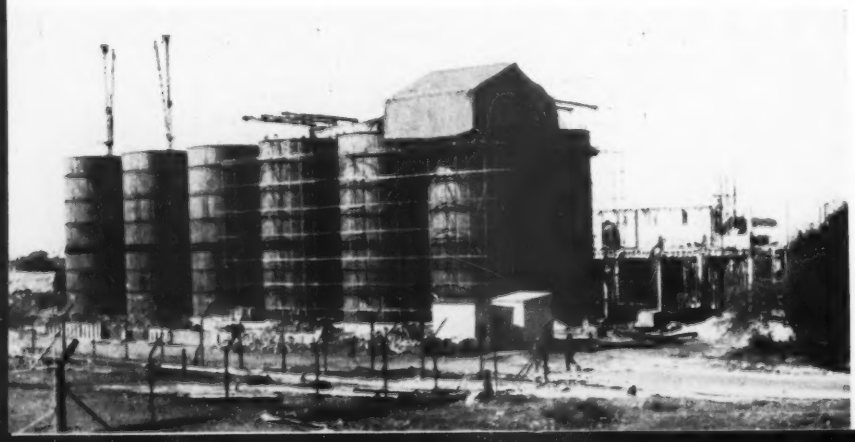
DAGGAFONTEIN'S £3.9-MILLION plant for leaching uranium.



HUGE INVESTMENT at Daggafontein includes this sulphuric acid plant.



WEST RAND CONSOLIDATED'S £1.6-million plant started last October.



STILFONTEIN'S PLANT (left) will operate by late 1953. Rubber-lined acid pachuca tanks shown here.

plosives and Chemical Industries for acid manufacture for many years. Reference is made to uranium and acid plants later.

The annual net profit, as originally estimated, was given at 9d to 1s per share, representing £160,000 to £210,000 apart from profits occurring to deferred shareholders. On present information, this mine promises to become, proportionately, one of the most profitable of the uranium producers, benefiting from its high-grade ore and from the extensive development performed in the past.

In January, 1953, West Rand Consolidated declared a net profit of £124,707 (subject to adjustments) from uranium production during the period of initial operations—a period of a little over three months, ended Dec. 31. This amount was greater than expected in outside mining circles. The financial significance of the figure cannot be determined until the position as a whole has been covered fully in subsequent reports.

Randfontein Estates. The Bird Reef series enters from West Rand Consolidated into the Randfontein mine where different nomenclatures are applied. The most valuable member of the series in respect of gold is termed the East Reef on the Randfontein and is represented by the White Reef on the neighboring property. The more promising reef for uranium representing the Monarch of the West Rand Consolidated, lies 300 ft. above it and has not, so far, been extensively developed. Gold values were previously found to be too low. Both Randfontein and Luipaardsvlei will be able to draw on loan funds for the opening of this reef which uranium has transformed into an "orebody" of importance. The Randfontein company reports that a certain portion of the tonnage at present milled from other reefs will be substituted for an equivalent tonnage from the uraniferous Bird Reef series, but actual tonnage is not given. Nearly £4-million is being spent on the uranium and acid plants.

Economic benefits attainable are hard to assess. The company has been milling at the rate of 4-million tons a year with a small margin of profit, and ore reserves have dwindled to 4-million tons. If the Monarch fulfills present hopes as a

History and Geology in Brief

How the South African Uranium Program Started:[1]

April 19, 1915. Dr. A. W. Rogers reports occurrence of radioactive substances in South African ores.

October 1923. R. A. Cooper reports the occurrence of uraninite in South African ores.

1939. Scientists discover that the nucleus of uranium is fissionable.

1941-1945. Dr. G. W. Bain, geologist and consultant to the Manhattan Project, recalls R. A. Cooper's paper, and makes secret report on uranium occurrences to the United States and Great Britain.

1945. Both governments approach Union Government about possibility of extracting uranium from gold ores.

September 1945. Dr. Bain returns to South Africa as United States representative, to be joined by Dr. C. F. Davidson of the British Atomic Energy Division who represented the British Ministry of Supply.

1945. C. S. McLean, president of the Transvaal Chamber of Mines is requested to hurry to Pretoria on a matter of greatest importance and secrecy by Prime Minister General Smuts. Secret talks center about development of South African uranium resources. A uranium research committee is set up.

1949. Initial working groups are combined to form Atomic Energy Board. Over 400,000 samples of uranium ores from various gold mines analyzed in Canada and the U.S.A.

October 1949. Two years of metallurgical research in South Africa, Britain and the U.S. is climaxed by installation of a large pilot plant at Blyvooruitzicht Gold Mining Co., Ltd.

February, 1950. Second large pilot plant installed at Western Reefs Exploration and Development Co. A large plant is also built at Sub-Nigel, Ltd. which is subsequently used on three other mines.

Nov. 23, 1950. South African Atomic Energy Board, the U.S., and Britain enter into an agreement providing for large-scale extraction of uranium by four mining companies. Two others soon added to the list.

December 1951. The Atomic Energy Board and U.S. and Britain agree to expand the program for the production of uranium.

Oct. 8, 1952. West Rand Consolidated dedicates uranium mill—the first to produce uranium under the program.

Present. To date 16 mines have been approved as producers, with more expected to enter the program in the near future.

Origin of the Uranium—

IS IT SYNGENETIC?

THE GEOLOGICAL UNIT of the Atomic Energy Board has proved that the distribution of uranium in the upper division of the Witwatersrand System, in which lies the Monarch (Vaal or Basal Reef), takes the form of a series of uraniferous cycles of very definite pattern. These cycles are separated by periods of deposition when little uranium was contained in the material forming the beds. This pattern of alternating uraniferous cycles and barren sediments is maintained throughout the area tested, and all economic concentrations of gold are found within these cycles. Some show an abrupt beginning, which is usually associated with known disconformities, within the cycle, when, it is suggested, a reworking and resorting of the distributed gold took place. In other cases, cycles open slowly, build up to maximum intensity and die slowly away again.

—OR IS IT EPIGENETIC?

"In the gold-uranium ores of the Witwatersrand the two pay metals vary sympathetically and are clearly derived from the same mineralization. It is widely held in South Africa that the gold is of syngenetic origin; but since the uranium present (as uraninite) is certainly not of placer deposition this view cannot be maintained. The banket reefs differ from modern auriferous placers in possessing a much higher radioactivity than the latter, due to the ubiquitous presence of uraninite, a mineral which has never been recorded as a detrital constituent of any modern sediment. Conversely the refractory uranium and thorium minerals which account for the radioactivity of placers are absent from South African ores. The distribution pattern of radioactivity throughout the Witwatersrand Series as determined by radioactivity logging of boreholes, is wholly dissimilar from that found in normal sediments. Lead isotope studies suggest that the uraninite together with galena (and by inference, the gold and other sulphides) were introduced into the conglomerates by hydrothermal action about 1,700 million years ago.[2] [which would make the deposition eminently epigenetic—Ed.]

. . . OR MAYBE A BIT OF BOTH?

"The conclusion might, therefore, be justified that the Rand banket is a detrital gold deposit slightly enriched by hydrothermal processes."[3]

TABLE II. Reef Horizons of the Witwatersrand, Showing Significance as Potential Uranium Producers

Carbon Leader. To be worked for uranium in Blyvooruitzicht and West Driefontein mines.

Main Reef Series. These famous "reefs," Main Reef, Main Reef Leader, and South Reef, have been responsible for over 95% of the Rand's gold production to date. No uranium plant has been scheduled for working residues from this source. No uranium occurrence or occurrence or economic importance has been reported therein.

Bird Reef Series. In the West Rand, this comprises several bands, commonly poor in gold, one of which notably the Monarch is known to be highly uraniferous. In the Klerksdorp and Orange Free State areas, the Monarch Reef is represented by the Basal or Vaal Reef, above which lies a Leader Reef of relative importance in regard to gold or uranium.

Kimberley Reef Series. This is worked for gold in the East and West Rand. In the East Rand it is significantly uraniferous. (Daggafontein and Vogelstruisbult) but it has not been so determined in the West.

Elsburg Series. Gold-bearing conglomerates of important gold and uranium contents, only worked to the south of Klerksdorp (Western Reefs).

[1] Excerpted from "The Mining Survey" published by the Transvaal Chamber of Mines March, 1953.

[2] "The Gold-Uranium Ores of the Witwatersrand" by C. F. Davidson, Chief Geologist, Atomic Energy Division, Geological Survey & Museum, London, England as published in *The Mining Magazine* February, 1953.

[3] "Mineral Deposits" by Waldemar Lindgren, Fourth Edition, p. 246.

uranium carrier, and a big tonnage can be treated, the consequent revival in the checkered career of this great mine may be of exceptional significance. Maybe the additional source of profit has been discovered just in time to save the mine from early closure. Randfontein has treated 140 million tons of ore since its inception.

Blyvooruitzicht. On this rich mine, production is increasing to 120,000 tons per month for gold, and the uranium plant, due for completion early in 1953, will treat

accumulated slime in addition to current residues. It may be inferred that the uranium plant will have a monthly capacity approaching 160,000 tons. Under the original project shareholders were told that they could expect an additional annual net profit of 2d per share (£200,000), but now they are expecting something more. The company's working profit from gold, before taxation, is at the rate of £7-million per annum on 12.0 dwt ore.

West Driefontein. Now sharing the world's richest concentration of gold ore with Blyvooruitzicht. Has been put on the deferred list for uranium. No definite program has at any time been announced.

Stilfontein. This new mine will be a producer of uranium in about a year's time and has been named as a producer of sulphuric acid. An extra annual profit of 3½d per share (£190,000) is estimated. Present tonnage is 55,000 tons per month, with early expansion to 80,000 tons—all from Vaal or Basal Reef.

Western Reefs Exploration. One of the first four to be selected, this company working Elsburg series in the Klerksdorp district should have its £4,900,000 uranium and acid plants functioning early in 1953. It will draw on accumulated slime, in addition to treating current residues for uranium. An estimate published in 1951, on the original proposals, gave promise to shareholders of an annual net profit of £86,000 from this new source, but it is now hoped to show a bigger reward.

Welkom; Western Holdings, Free State Geduld; President Steyn; President Brand. These five mines of the Anglo-American Corp., forming the hard core of the Orange Free State goldfield, have been listed on a group or collective basis. Two uranium leach plants will be installed, each with a capacity of 100,000 tons of slime, one at Welkom and one at President Steyn. Welkom is a producing mine, but the others are still at an early development stage. Uranium production is expected to start in two or three years.

Virginia (O.F.S.) G.M. Co. in which the Kennecott Copper Corp. is heavily interested, is due to start uranium production in 1955—a year after gold. This mine may also be the producer of sulphuric acid for the vicinity.

Harmony G.M. Co., Orange Free State. Construction of a uranium recovery plant is to be started as soon as possible, and it may be assumed that production will start during 1955 when some 45,000 tons of slime residue per month should be available for treatment, increasing to 90,000 tons per month in 1956. It is believed that the Harmony mine will rank amongst the richest producers of uranium in South Africa.

Sulphuric Acid Production

The uranium industry will draw its sulphuric acid, on a pool basis, from five or six plants using pyrites recovered from the mines on which they are located or transported from other sources. Thus the Government Gold Mining area, on East Rand mine not directly in the uranium picture, is erecting a pyrite recovery plant immediately below its reduction works at a cost of £125,000 on loan funds as a part of the general scheme. Pyrite is the commonest sulphide in Rand ores, running up to 3% or more, but a big recovery can only be obtained where wide reefs are mined and the pyrite percentage is not watered down by the inclusion of a high ratio of barren quartzite, stoped with a narrow orebody.

Sulphuric acid plants, each costing upwards of £1-million are of the contact type. The pyrite gravity concentrate is formed into a slurry by the addition of water and delivered to a Fluo-Solids roaster in which sulphur dioxide gas is produced at 1,600 deg. C. Cleaning and drying of this gas from the roaster is done in cyclones, scrubbing tower, electrostatic dust precipitator and drying tower before conversion into sulphur trioxide in the presence of what has been reliably reported to be a vanadium pentoxide catalyst. Sulphur trioxide gas is absorbed in sulphuric acid, built up to the requisite strength of 98% acid.

According to a statement made by the West Rand Consolidated Mines, their plant is the first in the world to combine the Fluo-Solids roasting of pyrite with a contact sulphuric acid plant.

Leaching and Precipitation Plants

In these plants, slime filter cake from the gold plant or slime from the residue dam is repulped with dilute sulphuric acid and agitated in rubber-lined pachuca tanks for about 16 hours. The pulp is then filtered in special Dorr-Oliver acid filters in the construction of which stainless steel is used, and which are imported from America.

After this, the pulp is agitated with water and again filtered on non-acid, rotary filters of the same type, but of normal construction and of South African make. This second treatment or wash removes nearly all of the uranium solution retained by the pulp after acid filtration.

The use of acid seriously impairs the efficiency of filtration, but it is found that the addition of animal glue effects a change upon the disposition of the slime particles, allowing freer percolation and consequently giving better results. Nevertheless the number of filters required is high, and an estimated 300 acid filters and non-acid filters are required in the present program.

A surprisingly heavy item of expenditure relates to the recovery of manganese dioxide, which is used as an oxidizing agent in the leaching plant and goes into solution as manganese sulphate. The barren solution from the uranium purification section contains this manganese which is recovered for reuse.

Subsequent treatment methods, for precipitation, were not disclosed to visitors who attended the opening ceremony at the West Rand Consolidated plant.

Heavy Capital Expenditures

Heavy capital expenditures involved in the uranium recovery is an outstanding feature. The cost of a reduction works upon the Rand today, to deal with a monthly 100,000 tons of uncrushed ore and to obtain a 97% recovery of gold, is £1,500,000. To deal with 100,000 tons of slime residue, which needs no grinding or classification, the uranium plant costs twice as much.

Although the South African Government is maintaining a discreet reserve, there has been no lack of optimistic appraisal of ultimate resources and possibilities by those enjoying political privilege. In his report for the year 1950, Government Mining Engineer Malherbe stated that the Rand represents "one of the world's largest known resources of uranium." Minister of Mines Viljoen has declared that the production of uranium may ultimately become as important to South Africa as that of gold. Prime Minister Malan has given his estimate of annual revenue from full production at £30,000,000. Minister of Railways Paul Sauer was even more expansive than his colleagues, speaking informally during an Australian tour.

HEADING-AND-BENCH METHOD is used by contractors in driving. Top heading is drilled with three-deck jumbo, here seen, traveling on 28-ft. gage track and mounting 17 3½-in. wet drifters of Joy make, each carried on Joy hydraulic boom and having 10-ft. feed. Bits are mainly Timken carbide with some single-pass Liddicoats. Round has 144 holes, mostly 16 ft. deep, pulls 15.7 ft. Powder is C.I.L. Driftite, semi gel, fired in delays up to 15.

Twin Bores Show Achievements in Modern Tunneling

Up-to-date techniques used in driving Ontario Hydro Power Commission's 51-ft. diameter tunnels, each 5.4 mi. long, at Niagara Falls, Ontario.

AFTER TOP HEADING ROUND IS BLASTED, giving 1200 cu yd. of broken rock, mucking proceeds with 3½-cu. yd. Northwest electric shovel, having dipper stick shortened to 13 ft. and loading into 13-cu. yd. end-dump Euclid truck. A 1-cu.-yd. Eimco rocker shovel and an HD20 Allis Chalmers bulldozer aid in cleaning up. Time required for loading out is about 4 hours 45 miautes. Muck is hauled to 26-ft.-diameter service shaft and hoisted in balanced 11-cu. yd. skips to 150-cu. yd. bin on surface.

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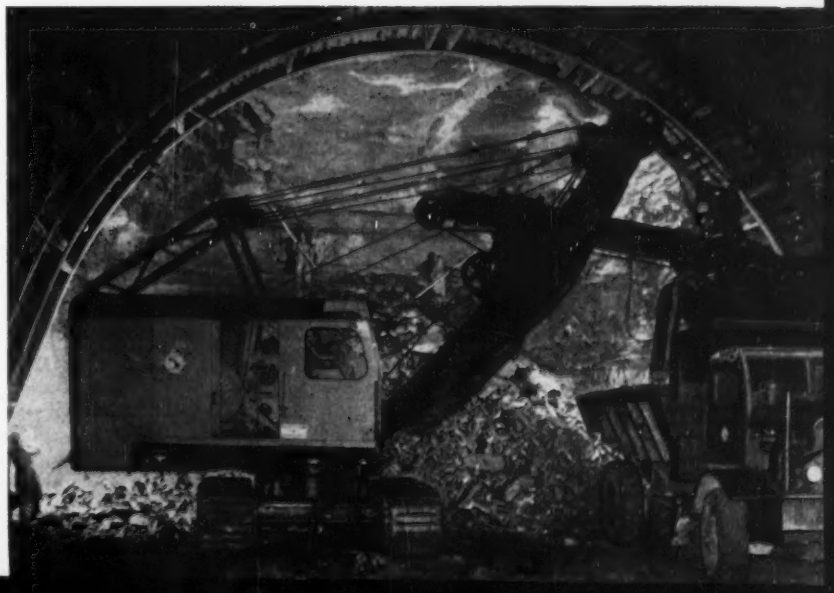
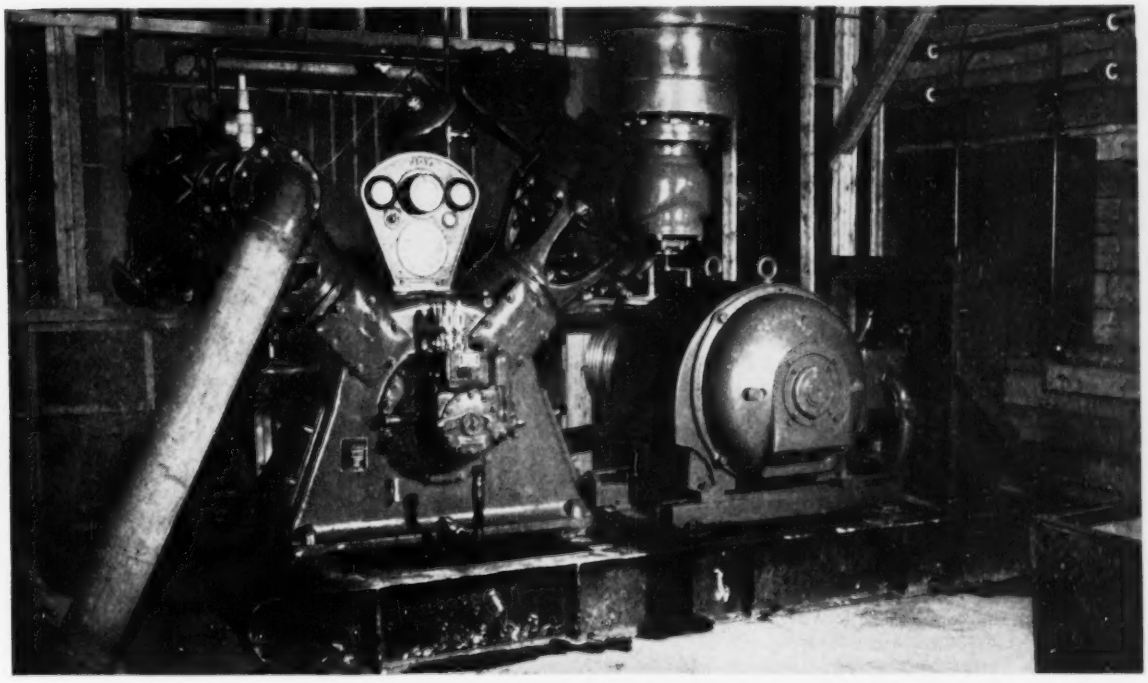


BENCH IS EXCAVATED by downhole drilling from platform jumbo, here seen spanning bench, and by blasting with millisecond delays. Twenty-five Joy drifters are mounted on bar on jumbo which is held at constant elevation. With this arrangement, depth of each hole can be figured to follow circular bottom contour of bench. Primary pattern for these holes is a 4x4-ft. grid, save for rim holes. Platform is moved by three Ingersoll-Rand tugger hoists.

FULL HEADING, 50 ft. high to top of steel, after bench has been removed. Steel supports are used only above spring-line, consisting of four-piece steel ribs made of 8-in. W F beams spaced 4 ft. apart, lagged with 6-in. light channels or 12-in. pans and stiffened with timber spreaders. Full section runs 75¼ cu. yd. of excavation per ft. of tunnel, of which 44 cu. yd. is taken from top heading. Curbs will support forms for subsequent concreting.

Continued from page 77

FOUR SHAFTS, each of 26-ft. inside diameter and 200 to 330 ft. deep, are sunk on line midway between tunnels, all four serving both tubes. Each is equipped with cage and balanced muck skips. Cage is 9¼ by 22 ft. by 12 ft. high, can handle biggest equipment used in tunnels, including power shovel when dismantled. At left, a small truck has been brought to surface. At right, 11-cu. ft. skip is discharging into 150-ton bin in 120-ft headframe.



AIR FOR DRILLING is furnished by semi-portable compressors (Joy WN-102), arranged in banks of 6-10 at each shaft, depending on how work progresses, each unit delivering 750 cfm. A 150-hp. motor is customary unit drive. Air for ventilation is supplied by two sets of Joy Axivane fans at each shaft collar (not shown). The individual fans are set horizontally in tandem within 48-in. casings that hook into shaft vent pipes.

BALD EAGLE PIT is in background, housing area in foreground. Pit is about three-quarters worked out. Big Wash is between the two in left center. Off picture to right is the North-South pit, shown on opposite page.

Kaiser Stepping Up Production

With two pits in operation, ore shipments to Fontana steel plant are expected to attain rate this spring of about 2,160,000 tons per year

GEORGE W. HUSEMAN
Mine Engineer
Kaiser Steel Corporation
Eagle Mountain, Calif.

IN THE AREA INVESTIGATED by Kaiser Steel Corporation at its Eagle Mountain iron property in California two pits have been laid out, the Bald Eagle pit to the west and the North-South orebodies pit to the east. Approximately 800 ft. of semi-explored ground lies between the pits in a large wash.

In Bald Eagle pit, which consists of the lower bed only, the iron formation dips 55-65 deg. normally, and is 60 to 80 ft. wide, depending on the amount of interfingering on the hanging wall. Several "B" faults, cutting diagonally and running roughly parallel, dropped the orebody segments, giving it an apparent thickness of over 300 ft. on some benches. Here, two large "A" faults also cut the ore formation into blocks. One block of about 300,000 tons remained as an erosion remnant and was mined. Another over 1500 ft. long, is part of Bald Eagle pit. Except for a small ore block on the highest bench, all upper bed ore was eroded by a wash to the north. Lower down to the northeast, on ground covered by overburden where exploration is incomplete, the upper bed may exist in workable amounts.

East of Bald Eagle pit, across the wash, both lower and upper ore beds rise 400 ft. above the alluvial floor to form an oblong hill. These are the North-South orebodies. Relative to the lower bed in Bald Eagle pit, the beds were moved south 700-800 ft. by a large "A" fault. Both beds are plainly visible, striking east-west and dipping north. The lower bed, or South orebody, 50-80 ft. wide, has regular footwalls and hanging walls, is well mineralized throughout with ore of uniform grade and dips 30-40 deg. north. The upper bed or North orebody, lying discordantly 50-250 ft. above the lower bed, is 190 to 400 ft. wide on the surface, has a definite footwall dipping 45-55 deg., but not a definite geological hanging wall. Mineralization, widest on the surface, "fingers" out, beginning on the hanging wall and going down until less than one-half its original width remains at places on the pit floor at 1200 ft. elevation.

OPERATIONS IN NORTH-SOUTH PIT are shown in foreground. In center background is the Bald Eagle pit with its dumps. In between are the two crushing plants, for the pits, the crushed ore stockpile, and the railroad.

at Eagle Mountain Iron Mine

Magnetite the Primary Source

Ore is hematite and magnetite, with varying amounts of pyrite at times. Hematite with pseudomorphic crystals after magnetite occurring at different depths indicates that the primary source of ore was magnetite except for some magnetite-pyrite lenses. Where pyrite was present, oxidation has removed it for about 200 ft. down, unless protected in unshattered blocks which are not easily leached. The heaviest pyrite carrier is the North orebody. Most of the ore is massive and has a high iron content where it is not shattered and diluted by faulting.

In shattered zones, alteration has reached the limonite stage with complete absence of sulphide ore. However, these areas carry calcium sulphate to depths of about 250 ft. Sulphur from Bald Eagle pit has averaged 0.380%. In North-South pit, exploration shows 0.603% sulphur. Sulphur is the most detrimental element in the Eagle Mountain ore. To make suitable blast furnace feed requires separating and sintering the fines.

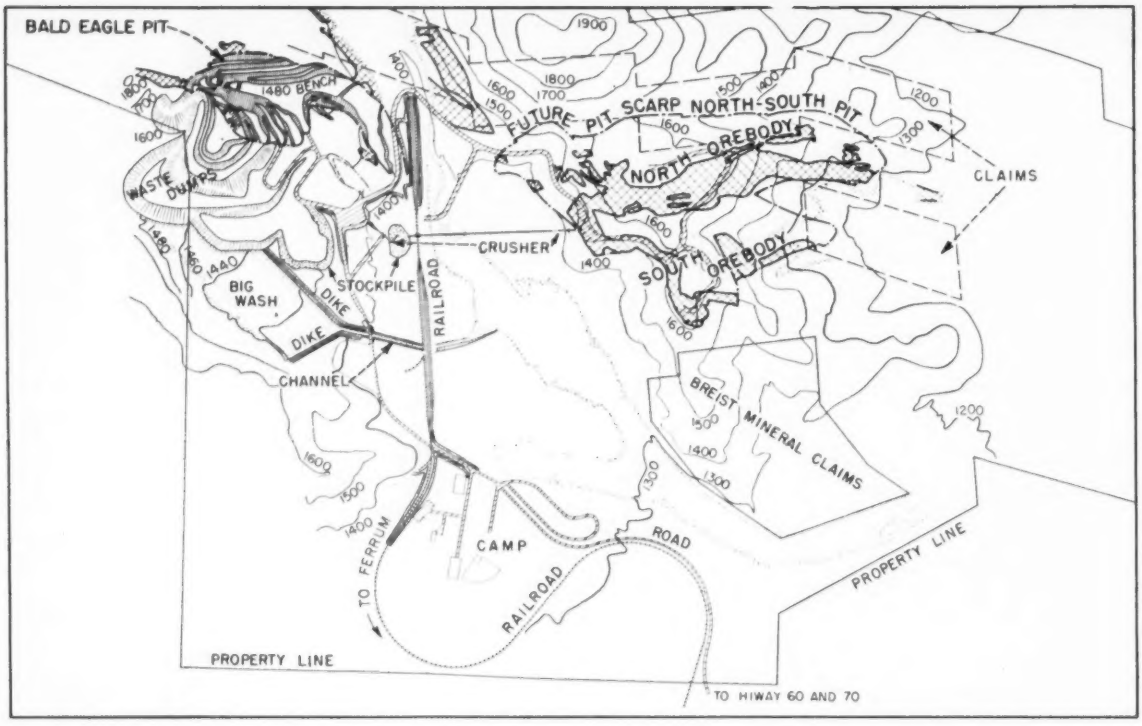
Phosphorus is no problem. The average for Bald Eagle pit is 0.074%, and North-South pit will have approximately 0.086% P, with small areas running up to 0.510% in or near intrusives. Other metals in the ore are copper, manganese and titanium—none in sufficient quantity to cause trouble except in making special steels. Tests indicate that ore can be readily treated to obtain a 58-60% iron product. A plant is being built.

Exploration and Pit Plans

Except for surface trenching on ore exposures, all exploration is done by diamond drilling, preceded by a thorough magnetometer survey when possible. The importance of complete and accurate exploration data cannot be overstated.

A triangulation net is first spread over an area to be explored and a section baseline laid out at 100-ft. intervals on the strike of the orebody and at right angles to it. Transverse lines are then run from the baseline toward the footwalls and the hanging walls, as far out as needed for good topographic and geologic control. Maps and sections are then made on which prospective core-drill holes are plotted. If the exploration work is properly done, a reliable mining plan for extracting ore can then be made and followed without change from highest to lowest bench. Location of the pit scarp, berms, benches, along with other pertinent data, grade of ore, amount on each bench, cubic yards of stripping waste, elevations, all are known so that work can be planned.

(Continued on page 83)



MAP OF EAGLE MOUNTAIN MINE shows Bald Eagle orebody 75% worked out and North-South orebodies undisturbed. Future pit outline for latter is indicated save for area to east containing over 7-million tons.

The Background

EAGLE MOUNTAIN MINE is in the desert region of southeastern California. By air, it is 175 mi. east of Los Angeles, in Riverside County, about midway between Indio and Blythe. The camp, comprising 49 dwelling houses (96 more are being built) shops, dormitories, mess hall, commissary, post office and recreation facilities for 300 people, is located at 1390-ft. elevation on an alluvial fan half a mile south of the present mining operations. Iron outcrops run roughly east-west along foothills in a spur of the Eagle Mountains. This is the extreme eastern end of the iron formation which extends about 7 mi. to the west.

First claim locations were made by gold prospectors before there was a road connecting the Colorado River area with Coachella-Imperial Valleys, probably as early as 1865. These and other ventures later in lead, zinc and silver along the iron belt were of doubtful success. Iron mining was ignored until about 1890 when railroading became important in the Southwest. Visualizing possibilities of better transportation and the ever-increasing demand for iron, L. S. Barnes, a promoter, had the acumen to consolidate various claims and groups.

E. H. Harriman of the Union Pacific Railroad purchased the entire holdings of over 100 claims in 1908. Shortly thereafter, a railroad location survey was made from the Southern Pacific Lines near Salton Sea to the exposed iron formation now being mined. Whether Harriman intended laying rails and mining ore is not known. The threat seems to have been effective in bargaining with eastern steelmakers for cheaper rails and bridge steel.

In 1946 Kaiser Steel Corp., operating a blast furnace and seven open-hearth furnaces at Fontana, took over the group from subsequent owners. This was after the U. S. Bureau of Mines, in conjunction with the U. S. Geological Survey on an iron investigation program in 1941-42, disclosed considerable commercial ore and prospects for even greater amounts. The area investigated covered about 1½ mi. of outcrops on the extreme east end of the iron belt.

In discussing the Eagle Mountain mine here, only the eastern portion covering about 1½ mi. containing two pits, is considered. Outcrops extending westward have not been explored beyond limited surface examination.

Two early Paleozoic dolomite beds lying discordantly with 50 to 250 ft. of schistose quartzite between them are the present sources of the iron ore. It is generally thought that, in the course of severe structural changes quartz monzonite magma, acting on the invaded calcareous beds, formed iron in heavy dolomitic formations and lime silicates in less pure beds, possibly in an earlier thermal phase. Compression raised the beds along an east-west axis into a broad anticline. A long period of faulting, intrusion and erosion followed, leaving the beds as they are at present: The anticline top and its south limb are completely missing except for a small portion of the top on the South orebody, and the remaining North limb is exposed, showing both beds dipping northward.

The anticlinal bedding has been complicated by severe faulting which falls into two general classifications. The first, long north-south trending faults that dip steeply, cutting ore formations roughly at right angles—very much as a loaf of bread would be sliced, and displacing them vertically up to 250 ft. These are called the "A" series, of which there are at least seven extending from the west end of Bald Eagle pit eastward over 4000 ft., into the west end of the North-South pit. They mauled formations badly and commonly have fracture zones up to 100 ft. wide containing large ore blocks.

The other faults, called the "B" series, are short, east-west trending—with the ore formation—and are generally located between the "A" series faults. As pressure was not uniform in blocks made by the "A" faults, the shorter faults made adjustments within blocks, roughly at right angles to the "A" faults. They, too, are displaced vertically, but distances are much shorter and the mauling of the formation is much less marked.

THIS SHOVEL, a 5-cu. yd. Bucyrus-Erie, is on 1420 bench of Bald Eagle pit. Crushing plant for North-South pit appears in upper left.

(Continued from p. 81)

Planning for Mining

Briefly, mining plans as made at Eagle Mountain, are developed by working from sections. The sections have been sufficiently core-drilled so the orebody can be drawn showing footwalls and hanging walls along with deposition peculiarities, such as "fingering," incomplete replacement areas, vein splits, and fault displacements, dikes, etc. Working from these, a plan for extracting ore is made. On each section is drawn a tentative pit slope needed to extract ore shown on that section, which includes taking out enough waste so the pit can be worked safely. Here, the overall pit slope including berms, is about 50 deg. All sections are then projected into a horizontal mining plan so that they may be correlated with each other.

To get a smooth mining plan having a minimum of sharp curves, which makes for easy working and safety, some pit slopes on the sections have to be moved forward, others back, always keeping in mind the ratio of waste to ore roughly (if one has been set), the strike and dip of faults, fracture zones, etc. The object is to make a workable plan for safely extracting maximum ore with minimum waste. After an acceptable mining plan has been completed and sections are made to conform, ore and waste areas are checked separately by planimeter on sections and calculated. If overall results are satisfactory to management, they are again checked with the planimeter—this time carefully by benches—calculated, and the results entered as final totals for the pit operation.

From Plan to Operation

Converting a mining plan into operation simply becomes a matter of locating on the ground the toe lines and elevations for the various benches. Triangulation stations established within the pit as needed, from stations outside at convenient places, are best for this. In a few hours an engineer can give the pit foreman toe lines for drilling the blast holes that will keep drills busy for many days to come.

Having information on how an orebody is to be mined, the mine staff can coordinate operations. The crusher can be located for handling maximum tonnage with minimum hauling, waste disposed of without dumping too close or hauling too far, ore mined to meet certain grades and blends on large benches, and work carried out where most convenient and economical. These are important advantages of making a mining plan. Perhaps the greatest advantage is given to company policy. Management can set the ratio of ore to waste within reason and thereby know well in advance what ore costs will be when bidding in a competitive market for furnishing finished products.

Bald Eagle Opened First

The U. S. Bureau of Mines and the U. S. Geological Survey had done excellent pioneer work on both areas covered by the pits before the Kaiser Steel Corp. acquired the property. As their work was preliminary in nature and not intended for close control, such as is required in drawing mining plans, supplemental drilling was necessary.

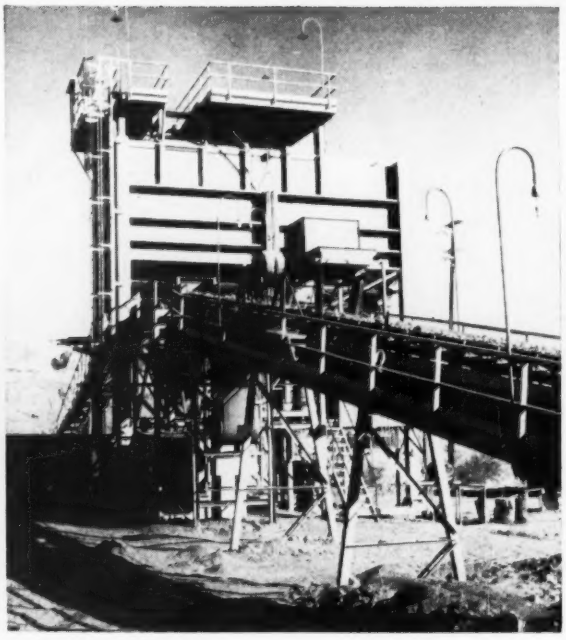
The first orebody for which a mining plan was made, in 1947, was the Bald Eagle deposit. To the 2914 ft. of core drilling done by the Federal Government, the company added 2423 ft. While it was not as much as was needed in badly faulted ground, to give all the information necessary, time was short. The ratio of ore to waste that was set for this pit was 1 ton of ore to 0.333 cu. yd. or less of waste.

The final figure on the completion of the mining plan, which included trimming, scaling and footwall waste removal where necessary, was 1 ton of ore to 0.345 cu. yd. of waste. This did not include cutting out the footwall lower down to accommodate a 150-B shovel, in place of a 54-B shovel as planned when the plan for mining was being made.

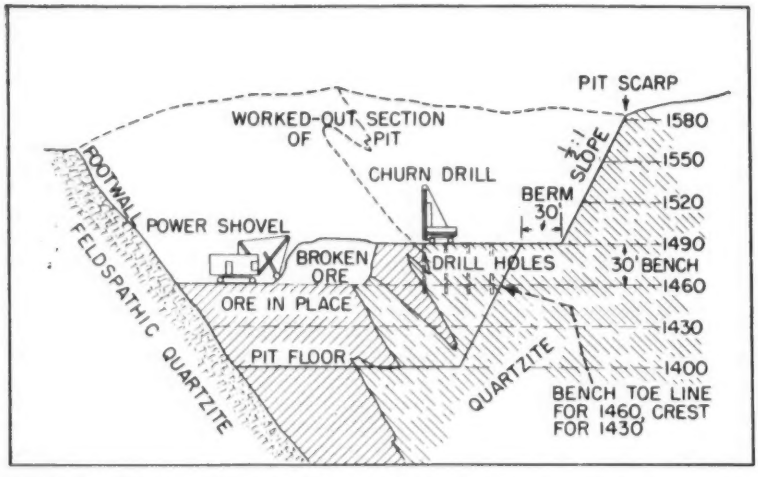
This pit is 2,200 ft. long, 850 ft. wide, the depth from the highest point to the pit floor being 490 ft. The ore was divided into two classes—second grade 40-50% iron and first grade plus 50% iron. This division was made solely on iron content in both pits. Calculations showed 1,585,000 tons of second grade (below the 1510 bench this grade was discontinued, the very low grade going as waste to be discarded and better ore being added to first grade), and 5,071,000 tons of first grade.

The pit plan on the footwall side followed the natural footwall

ABOUT 10,000 FT. OF CHURN DRILLING per month is necessary at Eagle Mountain for present output. Nine-inch holes are drilled 7 ft. below toe of 30-ft. bench.



TO THE "LOAD-OUT" conveyors bring Bald Eagle and North-South pit ores from crushing plants or stockpile for transfer to railroad cars.



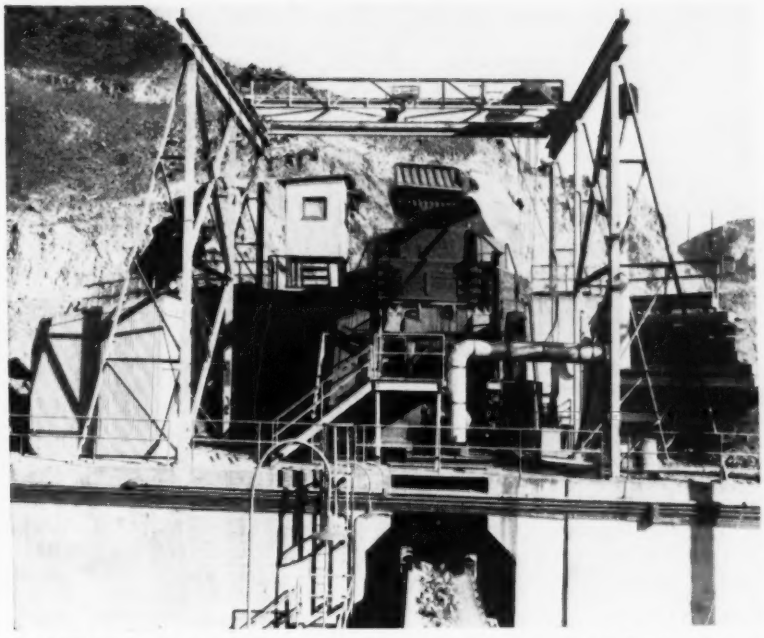
BENCH, BERM AND SLOPE ARRANGEMENT is explained by this schematic sketch. Ore occurrence shown is typical of that occurring in the North orebody of the North-South pit.

wherever possible. All benches are 30 ft. in depth. On the hanging-wall side, the pit slope is ½ horizontal to 1 vertical, with a berm 30 ft. wide added each 90 ft. vertically. There were 15 benches in Bald Eagle pit—the highest 1810 ft., the lowest 1360 ft. Opened in September, 1948, this pit is being worked now on the 1390 bench. It has produced over 4 million tons of first-grade ore and 794,000 tons of second grade before that grade was discontinued.

One Pit for North and South Orebodies

The large pit covering the North and South orebodies was opened for mining in May, 1952. It will be 4,600 ft. long, 2,000 ft. wide at one point, and 560 ft. from the highest elevation to the pit floor. It has 18 benches. To the 11,665 ft. of core drilling done by the Bureau the company added 14,523 ft. principally in exploring both east and west ends along the strike, and drilling on the dip to greater depth from a tunnel. Before the drilling was done by the company a magnetometer survey of about 3,500 setups was made. When correlated with previous drilling and geology, this work made spotting of proposed diamond-drill holes for a pit plan comparatively simple. Here, as in the Bald Eagle pit, the paramount consideration in the supplemental drilling was to determine possible ore extensions on each end, location of fault blocks, offsets made by faulting, and to permit close control of ore and waste areas that might fall within pit limits.

As the Bureau had drilled downward from the surface over the main parts of both orebodies as far as was practical to get reliable core and sludge samples, the Kaiser company drove a 2,826-ft. tunnel to get greater depth under the main ore exposure. This was driven in two parts, parallel to and in the footwall of the North orebody, both flanks of both orebodies being exposed on the east and west ends. Topography and formation were ideal for such work. The west entrance began at 1390 ft. elevation, was driven 1277 ft., and the east entrance began at 1250 ft. elevation and was driven 1549 ft. Headings were connected by a 153-ft. raise. Diamond-drill stations were



CLOSE-UP OF 66x84-IN. CRUSHER which serves North-South pit. A separate crushing plant serves Bald Eagle pit. This is located on other side of railroad shown in map on p. 82.

cut at 200-ft. intervals, or closer where needed in geologically doubtful areas, and holes drilled as plotted, unless adjoining holes made changes necessary. Both orebodies could be reached for exploring from the tunnel. Sixty holes were drilled from underground and surface stations. Sludge samples as well as core samples were taken at intervals of five or less feet and both were run for complete analysis before being combined.

The ore in the North-South pit was divided into two categories, 30-50% iron (the iron content was lowered to 30% at this pit, pending beneficiation) and plus 50% iron. Combined grades total 51,094,000 tons assaying 50.7% Fe, 0.086% P, 12.18% SiO_2, 1.64% Al_2O_3, 1.87% CaO, 5.42% MgO and 0.603% S. Waste to be stripped to permit extracting this ore totals 19,672,000 cu. yd. Both orebodies will be worked as one pit, for which the ratio of ore to stripping will be 1 ton of ore to 0.385 cu. yd. of waste. This is not as favorable a ratio as that in the Bald Eagle pit. Benches, however, will be much larger and therefore more economically worked.

As in the Bald Eagle pit, the mining plan follows the footwall of the South orebody, includes the North orebody and provides for slopes ½ horizontal to 1 vertical with 30-ft. berms every 90 ft. vertically on the hanging-wall side. This makes an overall slope of about 50 deg. Benches are 30 ft. in depth. The crusher is set at the 1,500-ft. elevation which will permit mining over 15 million tons of ore before moving to a lower elevation.

As raw materials superintendent for Kaiser Steel Corp., K. B. Powell and his assistant, B. A. Binkley, with offices at Fontana, are advisory heads of mining operations, with the following staff at Eagle Mountain: J. G. Hansen, superintendent, John D. Burgess, assistant superintendent, George Huseman, mine engineer, W. A. Horton, pit operation, C. A. Scott, shop and maintenance, B. T. Meyer, railroad operation, Frank M. Underwood, office and warehouse, and W. Kelley, camp steward.

The tonnage of ore mined from month to month and from year to year varies according to blast furnace requirements at Fontana where the Kaiser Steel Corp.'s plant is located, and with the amount of Utah ore purchased by the corporation for open-hearth use. In 1949, the first full year of operation, 618,900 tons of ore was shipped from Eagle Mountain analyzing 54.63% Fe. In 1950, a second blast furnace, of 1,200 tons daily capacity, was added at Fontana and tonnage from Eagle Mountain increased to 947,299 tons running 54.39% Fe. This figure was further increased in 1951 to 1,331,898 tons of ore 54.72% in iron, and again in 1952 to 1,652,842 tons analyzing 54.68% Fe. Another 1,200-ton blast furnace, now under construction, will go into operation May, 1953, requiring an additional increase to about 2,160,000 tons per year.

So far as possible, operation of the pits is kept flexible so that production can be increased or decreased within reasonable amounts to meet plant requests and for emergencies such as railroad wrecks, or washouts, crushing plant breakdowns, power failures, etc. This is done, when possible, by having several benches opened far enough ahead so that work can be concentrated entirely on ore or on waste as needed. Production is further regulated by stockpiling any ore in excess over immediate needs, so that it can be drawn on in an emergency.

Ore grade is harder to control than tonnage, since all shipments are crude and are limited to available areas within a small part of the benches. This will be overcome in the large pit once several of the smaller benches on top are mined and larger benches below are reached. As it is, grade of ore may vary from day to day as much as 8% Fe. In the office where shipment returns are checked, grade is watched carefully and variations are leveled off to be no more than 3.5% for a month and no more than 1% for a year. In the present operation it is not possible to control sulphur content with any degree of accuracy. Although churn drill holes are sampled at 10-ft. intervals, the samples run, the hole surveyed and plotted on a bench map, high sulphur areas cannot well be avoided in limited mining sections.

How Operations Are Conducted

Churn Drilling. Benches are drilled with churn drills, once they have been trimmed back on slopes with jackhammers and wagon drills. Approximately 10,000 ft. of churn drilling is necessary each month in view of the present rate of production. Drilling is done mainly with 42-T Bucyrus-Erie churn drills. Holes are drilled to a point 7 ft. below the 30-ft. bench toe to insure good breakage for the total bench depth. All of the holes are collared and driven with a 9-in. California-type Mother Hubbard drill bit which is attached to a

30-ft. stem that weighs 4,200 lb.

Holes are cased with 10-in. casing driven as far as needed in caving ground generally 4-10 ft. Casing is recovered after blasting for further use. Casing loss incurred by blasting averages about 2 ft. for each 37-ft. hole. Water is added to each hole as needed to keep cuttings sufficiently fluid for good baling and sampling. Holes are spotted by the pit foreman about 15 ft. apart in rows spaced at 15 to 30 ft. Spacing of rows depends much on character of ground drilled and whether the bench face has been cleared of broken material. If a prospective shot is to pull against a face having much broken material, the first row of holes must be closer to the face than it would otherwise have to be.

Blasting. There is no set number of churn drill holes blasted at any one time. The number varies from 10 to over 100, depending on location and immediate need for broken material. A designated part of a bench is drilled out before loading; ore and waste areas are commonly drilled and shot together. The powder man in charge of a loading crew measures each hole to see if it has caved to any extent since drilling, notes formation, fracturing, character of ground, then indicates pounds of powder for each hole and delay caps which are to be used for each row. Dry churn-drill holes are loaded with 70% bulk ammonium nitrate dynamite "triggered" with 12¼ lb. of 60% gelatin containing two electric blasting caps. In ore, 350 to 450 lb. of powder is used per hole which then permits use of 20 to 25 ft. of stemming. Waste requires 20 to 25% less powder. Good fragmentation with minimum boulders is obtained in all but blocky hard ground on 0.40 to 0.45 lb. of explosive per ton of ore. Explosive consumed over the last year on both ore and waste was 0.372 lb. per ton of material broken.

Five Power Shovels

Shovel Loading. Five power shovels are in service at Eagle Mountain, all Bucyrus - Erie, mounted on crawlers. Two are electric-driven—a 120-B with a 4½-cu. yd. dipper, and a 150-B with a 5-cu. yd. dipper. Roughly 80% of pit loading is done by electric shovels aided by a Caterpillar dozer to "sweep" and keep truck haulageways clear. Normal loading for a large shovel in ore is about 5,000 tons an 8-hour shift and 6,500 tons in waste. Loading in the ore zone is slower; dikes, gangue, and fault breccia, if present, must be sorted, which is no easy task at times. For efficient operation, large shovels need an 80-ft. minimum of space in which to operate. As one truck is being loaded, another is backing in on the opposite side. The 2½-cu. yd. diesel-driven shovels are used mainly at stockpiles for reloading, in pit areas too narrow for large shovels, and on road-building. They can operate using two tracks, one on each side, in a 60-ft. space, and in emergency loading from one side, in a 35-ft. space. Small shovels will load 3,500 tons in ore and 4,500 tons in waste. In pit operation over a recent three-month period, average tonnage was over 14,000 tons per shift.

Hauling Mostly Downgrade

Truck Hauling. Trucks used principally are Euclid Type 31TD diesel-driven units, of 14.9 cu.yd. capacity, and Mack LV trucks of 15 cu.yd. capacity. These replace the smaller Type 27 FD Euclid, now used only in emergency. As most hauling is downgrade, trucks are equipped with Hydrotarder-type water wheels for added braking. Roads are kept to grades of 8% or under with minimum radii of 150 ft. on curves which have a super-elevation of about 0.8 ft. per 10 ft. Continuous sprinkling and grading are necessary to maintain smooth dustless surfaces, giving minimum tire wear.

Length of hauls varies from 500 to 2,600 ft. Truck speed is about 15 mph., loaded or empty. At waste dumps, a dumpman directs dumping and where necessary, dump faces are leveled with the Caterpillar dozer. Average per shift for a truck is about 900 tons of mixed ore and waste hauling.

Crushing and Loadout. Two crushing plants are provided—one for Bald Eagle pit, the other for North-South orebodies pit. The road elevation at the Bald Eagle pit crusher, where trucks dump into a 250-ton hopper, is 1426 ft. Ore is drawn from the hopper by a 42-in. pan feeder into a 48x60-in. jaw crusher set at 7½ in. which has a maximum capacity of 8,000 tons per eight-hour shift. Feed under 3½ in. is drawn off by grizzly and fed back on belt by vibrating feeder where it cushions the impact of coarse ore falling from the crusher onto a 42-in. conveyor. The conveyor elevates feed 50 ft. to a pivot point where a 42-in. pendulum conveyor, traveling on a 90-ft. arc track, distributes it on a stockpile capable of holding 110,000 tons. Ore from stockpile is drawn off through an underground reclaiming tunnel controlled at drawpoint by another 42-in. pan feeder onto a 36-in. conveyor belt discharging directly into 63-ton gondola cars standing on a railroad scale at 1,384 ft. elevation. Pan feeder, belt and scale are operated by a weighmaster from a control tower near the track.

At the North-South crushing plant, trucks dump at 1,500 ft. elevation into a 50-ton hopper feeding directly into a 66x84-in. jaw crusher set at 7½ in. which discharges into a rock box on a 60-in. conveyor belt delivering to a stockpile. The stockpile, having about 80,000 tons capacity, is drawn off through a reclaiming tunnel, elevation 1,373 ft., controlled at the drawpoint by a 60-in. pan feeder discharging into a rock box on a 42-in. conveyor belt. This dumps into an ore bin over the same track scale used by the Bald Eagle loadout.

To Fontana, 164 Miles

Railroad. Ore shipped from the Eagle Mountain mine to the K. S. C. steel plant at Fontana, travels 52 miles by the corporation's railroad and 112 miles by the Southern Pacific. Connection with the latter is made at Ferrum, a siding 90 ft. below sea level, near Salton Sea. At present four 1600-hp. diesel-electric locomotives handle two trains daily, hauling about 6,500 tons of ore. Three units coupled together and operated by one crew, make a round trip in less than eight hours from the mine to Ferrum and return. The extra locomotive is used for relief.

Progress Reporting. To keep management not resident at the mine adequately informed on progress, end-of-month surveys are made of all areas worked and results plotted on maps and sections affected by changes. Prints of this work, along with a monthly report giving details on tons of ore removed, source of ore, amount crushed, amount stockpiled, feet churn-drilled, tons shipped, tons loaded, waste removed, etc., operation of mechanical maintenance department, railroad and camp, are sent to all individuals who are concerned.

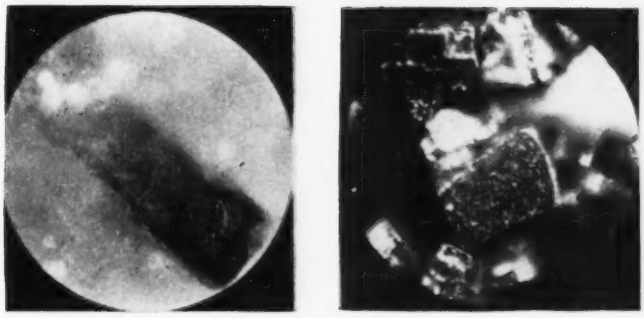


FIG. 1. So you think that slime coatings don't exist in a flotation cell? Take another look at these microphotographs. At the left is 200 mesh galena from tailings of Test 3 (Described below) heavily coated with c. p. $BaSO_4$. At right 65 mesh galena from tailings of Test 2 is heavily coated with barite slime.

Slime Coatings: How To Explain and Control Them

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VERY LITTLE ATTENTION seems to be paid to the role of slime coatings as a causative of valuable mineral losses in flotation processes. In the author's experience, many mill superintendents and metallurgists have expressed the opinion that slime coatings are only of academic interest. In their opinion these coatings do not exist in a modern mechanical flotation cell, because of its intense agitation. The exact opposite is true, however, as shown in the photographs of Fig. 1. Further, slime coatings can be explained and controlled by using the generalization that it is a chemical phenomenon.

The difficulty of separating oxide minerals in the presence of the —200-mesh fraction is well known. Treatment of —200-mesh sulphide ores, while not ordinarily as difficult, sometimes can be helped by desliming operations.[1] If desliming helps in the separation of remaining coarse minerals, then slimes either, (1) React with the chemicals, preventing organic coatings on the coarse minerals; (2) react with the coarse minerals forming slime coatings; or (3) both react with chemicals and react with coarse minerals.

This general problem of ore treatment in the presence of slimes was divided into (a) slime reactions with sulphide minerals, and (b) slime reactions with oxide minerals. This investigation is the first part of the larger project, limited to slime reaction with certain sulphides.

Slimes On Sulphides

This investigation was limited to $BaSO_4$, $SrSO_4$, $CaSO_4$, $PbSO_4$ and $PbCO_3$ slimes on galena, pyrite and sphalerite. $BaSO_4$ slime was chosen because many sulphide ores contain barite as one of the gangue minerals.[6] Further, some limestones contain minor amounts of barite[7] and thus barite may be added to flotation pulps with lime derived from these limestones. $SrSO_4$ slime tests were used to check surface equilibrium constants. Calcium sulphate is usually present as a precipitate formed by adding lime to the flotation pulps, which contain sulphate ions. At least one mill[7] has deliberately added calcium sulphate to the ore as a pyrite depressant. The oxide lead slimes were chosen because of the difficulty of floating galena in some semi-oxidized ores.

Table 1 summarizes results of flotation tests using —200-mesh barite slime and c.p. $BaSO_4$ powder, under the conditions listed. Figs. 1 (a) and (b) show galena particles from tests 2 and 3 respectively. Sulphide particles from test 1 (without slime in pulp) were similar to those of Fig 5.

Fig. 1 and the tests of Table 1 show that slime coatings are possible in laboratory flotation cells. As it has been observed that mechanical laboratory flotation machine agitation is usually more intense than in mill-scale machines[9], it seems reasonable that the phenomenon is possible in mill-scale machines, too.

Captive Bubble Tests

Captive bubble tests with galena, pyrite and sphalerite, conditioned in various slimes, were carried out to determine the nature of slime attachment. The procedure was as follows: Mineral specimens were mounted in lucite, and polished, the final stage being on a denapped cotton cloth, backed with a cleaned stainless-steel wheel, using a distilled water suspension of 0.5 micron alumina. Polishing was always finished by flooding the wheel with distilled water for one minute. Slime-free, water-wet surfaces were thus obtained. Captive air bubbles would not stick to such surfaces after one hour's induction time. The clean specimens were then conditioned in the various slurries and/or solutions, resting on the beaker bottom, face up, without stirring. After conditioning, the specimen

was washed in running distilled water (at a pressure of 3 ft. of water) for 30 seconds, and transferred to a cleaned optically-clear test cell. A captive air bubble was then brought in contact with the specimen, so that the bubble was not visibly deformed. A Jones and Lamson comparator was used for viewing the bubble reaction. The bubble was magnified 10X.

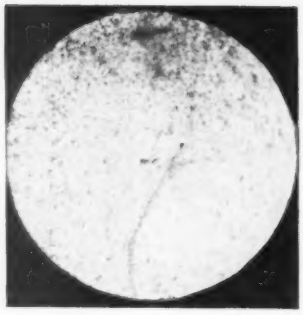
After suitable induction time, the specimen was air-dried and examined under the microscope. These observations were made with Leitz Ultrapak system, using polarized light, and 22X (dry) or 60X (oil immersion) objectives and a 6X ocular.

Brownian movement observations were taken for all slurries. Two methods were used: shallow cell, consisting of a glass slide with cover glass immediately on top of slurry sample; deep cell, consisting of a glass ring glued to a slide. A Leitz Panphot microscope, equipped with a cardioid condenser for darkfield illumination and 12X or 40X objectives with a 6X ocular, was used for these observations.

The tests summarized in Table 2 were made.

Table 2 shows that $BaSO_4$ coatings can be formed in the presence of a collector such as ethyl xanthate, and that flotation is inhibited as shown by the 0° contact angles of tests 4 and 6.

Does the slime prevent ethyl xanthate from reacting at mineral surfaces? Tests similar to those of Table 2 were made, except that air bubbles were pressed on the mineral surface, and deformed as much as possible. Results are summarized in Table 3.



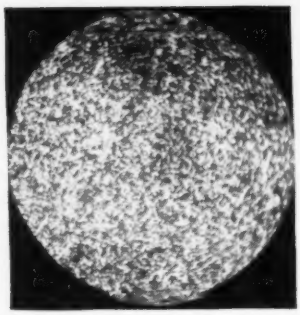
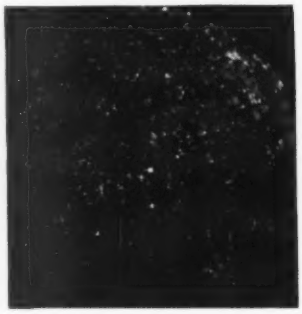
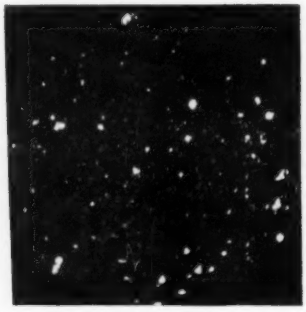


FIG 2. These are some typical slime coatings observed during the tests, magnified 22x obj., 6x ocular.

(A) This is a heavy $BaSO_4$ slime coating on pyrite.

(B) Medium to heavy $BaSO_4$ slime coating on galena.





(C) Light to medium $BaSO_4$ slime coating on sphalerite.

(D) Light $BaSO_4$ slime on galena in the presence of amyl xanthate.

Fig. 3 and tests of Table 3 show that ethyl xanthate exists at the mineral surfaces because of the contact angles produced, and the fact that some of the slime was displaced under the air bubble. Further evidence is Fig. 3 (c) showing the displacement of slime under the air bubble, even though the air bubble was only in light contact with the galena surface. Deformed air bubbles were rubbed across a slime-coated surface. No trace of the path could be found. The bubble does not physically push away any slime. A galena particle conditioned in a 1% $BaSO_4$ slime (no ethyl xanthate present) and then contacted with a deformed air bubble, gave no evidence of slime displacement under the bubble. Sphalerite conditioned with or

TABLE 1 — FLOTATION TESTS

CONDITIONS

ORE: Artificial mixture of 190 grams SiO_2; 20 grams galena, 20 grams pyrite, 20 grams sphalerite; −65 + 200-mesh. Sulphides hand ground in clean agate mortar. Silica ground in steel coffee-mill, leached with hot aqua regia, washed with distilled water till filtrate was negative to $AgNO_3$

FLOTATION MACHINE: 1,000 g. Fagergren glass bowl machine. Cleaned with mixture of sodium dichromate and concentrated sulphuric acid, rinsed with running tap water, and then distilled water.

PULP WATER: Distilled water.

REAGENTS: Sodium ethyl xanthate, obtained from American Cyanamid Co. analyzed 98.5% sodium ethyl xanthate. Leached three times with U.S.P. ether and kept in vacuum desicator. Methyl amyl alcohol, technical grade, was the frother.

SLIME: Massive barite was obtained from Wards' Museum, and hand ground in a clean agate mortar. $BaSO_4$ slime was c.p. $BaSO_4$ powder, of about 5 microns average size.

TESTS

Test No.	Additions	Cond. Time	Flot. Time	Results: Grade	Results: Recovery
1	(a) 50mg/l ethyl xanthate .05 c. c. frother	10 min.	5 min.	39.6% Pb 24.0% Fe	86.5% Pb 94.0% Fe
	(b) 50mg/l $CuSO_4$ $.5H_2O$ .05 c. c. frother	1 min.	5 min.	61.0% Zn	92.3% Zn
2	25g −200-mesh barite; 50mg/l et x; .05 c. c. frother	10 min.	5 min.	38.4% Pb 25.0% Fe	5.2% Pb 6.1% Fe
3	25g c. p. $BaSO_4$ 50 mg/l et x .05 c. c. frother	10 min.	5 min.	0.5g concentrate	Nil

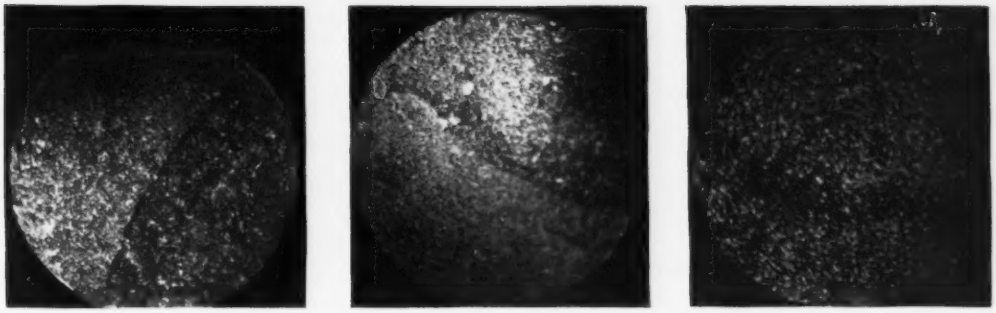


FIG. 3. Does slime prevent xanthate from reacting at mineral surfaces? These pictures showing that some slime was displaced under air bubbles would indicate a "no" answer.

(A) $BaSO_4$ slime on galena. Air bubble had been on the right.

(B) $BaSO_4$ slime on pyrite. Air bubble had been on the lower left.

(C) $BaSO_4$ slime on galena. Bubble made contact ⅓ of way from bottom.

without ethyl xanthate in the slime behaved similarly.

So far the evidence shows that collector coatings and slime coatings can co-exist on a mineral surface. The role of organic collectors will be discussed in detail later in the paper. We will now consider the mechanism of inorganic coatings.

From the evidence to be presented, the conclusion has been reached that the chemical theory postulated by Del Giudice[1] is essentially a good practical generalization, capable of explaining the inorganic slime coatings investigated herein. Consider the following equations:

(I) Metal $S + O_2 \rightleftharpoons$ Metal SO_4 (Mineral)

(II) Metal $SO_4 \rightleftharpoons$ Metal $^{++}$ $SO_4^{=}$ (Mineral)

(III) $BaSO_4 \rightleftharpoons Ba^{++} + SO_4^{=}$ (Slime)

It has been established that metallic sulphide mineral surfaces are sulphated.[10] If the bond between the slime and mineral surface is a common ion, in this case, $SO_4^{=}$, then the model is that while the slime gains and loses equal numbers of ions incessantly, as well as does the mineral surface, a slime particle near the mineral surface can gain a $SO_4^{=}$ ion common to the mineral surface. Thus a mechanism of attachment is established. Looking at solubility constants; $BaSO_4$[11] 9.9×10^{-11}; $PbSO_4$[11] 1.8×10^{-8}; $Fe_2(SO_4)_3$[12] slightly soluble; $ZnSO_4$[12] soluble; it may be noted that in every case, $BaSO_4$ has the smaller equilibrium constant.

If the $BaSO_4$ slime coating is held at mineral surfaces by common $BaSO_4$ molecules, such coating should be inhibited if: (a) oxygen is displaced from the slurries so that the mineral surfaces would be substantially sulphide surfaces. Since BaS is a soluble salt and metallic sulphates are more soluble than metallic sulphides, no attachment mechanism would be possible. (b) Sulphate ion concentration increased so that equations (II) and (III) go to the left, preventing many reactions at the mineral surface; (c) The mineral metallic ion concentration increased so that equation (II) goes to the left. This concentration should be such that the metallic sulphate could not form on the slime surfaces. Because of equation (II) going to the left, there should be few reaction sites on the mineral surface.

TABLE 2

Test No.	Mineral	Slime and/or cond. reagents. Cond. time 30 sec.	Air Bubble Induction Time	Contact Angle	Mineral Surface Description	Observation of Slurry: Deep Cell	Observation of Slurry: Shallow Cell
1	Galena	1% $BaSO_4$	5 min.	0°	Med-Hvy.	Brownian Movement	Brownian Movement
2	Sphalerite	1% $BaSO_4$	5 min.	0°	Lt-Med.	Brownian Movement	Brownian Movement
3	Pyrite	1% $BaSO_4$	5 min.	0°	Heavy Coating	Brownian Movement	Brownian Movement
4	Galena	1% $BaSO_4$ 50mg/1 et x	5 min.	0°	Med-Hvy. Coating (see Fig. 3)	Brownian Movement	Brownian Movement
5	Sphalerite	1% $BaSO_4$ 50mg/1 et x	5 min.	0°	Lt-Med. Coating (see Fig. 2)	Brownian Movement	Brownian Movement
6	Pyrite	1% $BaSO_4$ 50mg/1 et x	5 min.	0°	Heavy Coating (see Fig. 2)	Brownian Movement	Brownian Movement
7	Galena	50mg/1 et x	20 sec.	60.5° ±1.5°	clear	.....	.....
8	Sphalerite	50mg/1 et x	5 min.	0°	clear	.....	.....
9	Pyrite	50mg/1 et x	20 sec.	60° ±2°	clear	.....	.....

TABLE 3

Test No.	Mineral	Slime and/or Cond. Reagents Con. Time 30 sec.	Air Bubble Induction Time	Contact Angle	Mineral Surface Description
1	Galena	1% $BaSO_4$ 50mg/1 et x	1 min.	52°-55°	Med-Hvy coat (see Fig. 3)
2	Galena	1% $BaSO_4$ 50mg/1 et x	5 min.	52°-54°	.....
3	Pyrite	1% $BaSO_4$ 50mg/1 et x	10 min.	0°	Heavy coat (see Fig. 3)

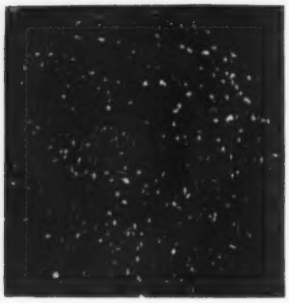


FIG. 4. $SrSO_4$ forms a medium coating on pyrite (above), a light coating on sphalerite and no coating on galena. Why? Check equilibrium constant.

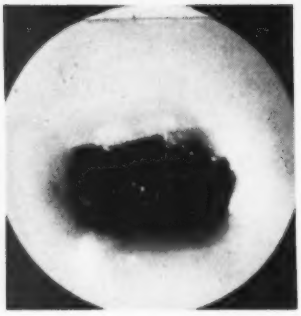


FIG. 5. This 200-mesh galena particle from concentrate when anyl xanthate was used as collector, shows no coating in presence of $BaSO_4$ slime.

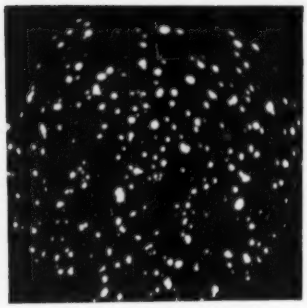


FIG. 6. $PbSO_4$ slime coats galena in presence of ethyl xanthate, because reagent coats both and surfaces become "soluble" in each other.

The captive bubble tests of Table 4 show that slime coatings are inhibited by the above conditions. Notice that displacement of oxygen from the slurry, by helium, could not have affected any electrical measurement except that of the sulphide mineral surface.

Further Checks

As a further check on tests 1-3, a flotation test similar to test 3, Table 1, was made, and in addition using 3.75g/1 $Na_2SO_4.10H_2O$ (about 7 lb./ton ore at ordinary dilutions). Results are excellent, and similar to results of tests without $BaSO_4$ slime.

Consider equations (II) and (III) again. If the concentration of Ba^{++} is increased, then, one might say that slime coating should also be inhibited, because the number of sites on the slime would be decreased. Using galena as the mineral surface, the equilibrium constants show that $BaSO_4$ should precipitate at the surface. Table 5 shows, however, that slime coating is *not* affected by $BaCl_2$, and that $BaSO_4$ is not permanently, at least, at the galena surface.

The fact that a relatively concentrated solution of $BaCl_2$ does not prevent an ethyl xanthate film on galena indicates that little $BaSO_4$ is at the galena surface. In test 2, while the increased Ba^{++} concentration drove the equilibrium position of the equation: $BaSO_4 \rightleftarrows Ba^{++} + SO_4^{=}$ to the left, still, $BaSO_4$ probably enters the reaction as postulated.

If the $BaSO_4$ equilibrium constant is less than $PbSO_4$, why doesn't $BaSO_4$ effectively form a layer on galena? The structure of galena is cubic. If one now substitutes SO_4 for the surface sulphur atoms, the surface lead atoms are still tied to the subsurface sulphur atoms as well as the surrounding surface sulphate ions. Since PbS is much more insoluble than bulk $PbSO_4$, the $PbSO_4$ at the surface of galena must have a smaller equilibrium constant than bulk $PbSO_4$. Ba^{++} was shown not to precipitate, effectively, at the galena surface, and yet the tests of Tables 1-4 indicate that $BaSO_4$ is the material common to the slime and galena surfaces. The conclusion is that $PbSO_4$ at a galena surface has an equilibrium constant the order of $BaSO_4$—that is about 10^{-10}. Further evidence for this, is the fact that c.p. $PbSO_4$ powder will not coat galena, as tested by the author, but galena slime will coat galena[13].

The $SrSO_4$ slime forms a medium coating on pyrite (see Fig. 4), and a very light coating on sphalerite. $SrSO_4$ slime does not coat galena. $CaSO_4.2H_2O$ slime did not coat any of the sulphide minerals tested. The equilibrium constants of the slimes are[11]: $SrSO_4$, 2.8 x 10^{-7}; $CaSO_4.2\ H_2O$, 2.4 x 10^{-5}. The $SrSO_4$ equilibrium constant is greater than that of galena, and of course no coating forms. In the case of sphalerite, it has been shown by Taggart & Hassialis[18] that Zn ethyl xanthate has an equilibrium constant of about 2 x 10^{-7}, and that, after many hours, it forms at a sphalerite surface. Therefore, the sphalerite surface must have an equilibrium constant of the order of 10^{-7}. The fact that a light $SrSO_4$ slime coating is observed agrees with the results reported by Taggart and Hassialis. Using arguments analogous to those of galena, an estimate of the pyrite surface equilibrium constant would be between 10^{-5} and 10^{-7}.

Brownian movement was observed in all slurries, except in text 2, Table 5, in a shallow cell. Such observations therefore are not reliable guides in predicting slime coatings.

Use of Collectors

When high tailings losses appear, one of the first remedies tried is increasing the amount of collector. If tailings losses are due to $BaSO_4$ slime coatings then increasing ethyl xanthate concentration to about 1 lb./ton ore will not prevent this coating. Tests are summarized in Table 6.

If purified pentasol amyl xanthate is substituted in equal molar concentration for ethyl xanthate, then only a light $BaSO_4$ slime is formed on galena and pyrite, as shown in Fig. 2 (d). A contact angle of 75 deg. ± 2 deg. was established with bubble-mineral in light contact, in 15 seconds. Galena conditioned in a 75 mg/1 amyl xanthate solution yielded contact angles of 85 deg. ± 1.5 deg.

To further check these results, a flotation test similar to test 3, Table 1, p. 3, but using amyl xanthate instead of ethyl xanthate, was performed. The results were excellent: Concentrate grades—40.6% Pb, 23.5% Fe; zinc concentrate 60.3% Zn; recoveries—90 to 95%. A galena particle in the concentrate is shown in Fig. 5.

The fact that ethyl xanthate does not prevent $BaSO_4$ slime coatings is an anomalous observation. It has been reported[14] that the equilibrium constant for lead ethyl xanthate is 6.7 x 10^{-16}. Further, it has been shown that organic films completely cover galena [10] for the molar concentrations and flotation test conditioning time (10 minutes) used by the author. Since the equilibrium constant for lead ethyl xanthate is 10^6 times smaller

than $BaSO_4$, it follows that $BaSO_4$ slime should not have coated galena. The fact that slime coatings do form, means either: (1) The reported lead ethyl xanthate equilibrium constant is too small; or (2) that equilibrium constants are not valid in explaining the organic-metallic reactions at sulphide surfaces. Argumentation would be largely qualitative, in the absence of data. We are now obtaining such equilibrium constant data. However, the facts that amyl xanthate substantially prevents $BaSO_4$ slime coating, and it is well established that metallic amyl xanthate salts are more insoluble than metallic ethyl xanthate salts, lend credence to the hypothesis that the lead ethyl xanthate equilibrium constant may be in error.

Semi-Oxidized Ores

Recovery of sulphide minerals from semi-oxidized ores is difficult. Part of the explanation is that various ions, such as Cu^{++}, Fe^{+++}, $SO_4^{=}$, are present in high concentrations, altering the usual metal-organic and inorganic reactions. In the case of galena, at least, there is an additional phenomenon. If galena is conditioned in a 1% slurry of c.p. $PbSO_4$, no slime coating is formed. On addition of 50mg/l ethyl xanthate, and 30 seconds conditioning, a medium slime coating is formed, as shown in Fig. 6. This is explained by the fact that ethyl xanthate coats both the galena and $PbSO_4$, and the xanthated surfaces are now "soluble" in each other very much like two oils. Similar observations have been previously reported by Bankoff[3]. Practically, however, it means that the mineral surface is now xanthated anglesite, and not xanthated galena. Therefore, the difficulty of floating this galena is a problem similar to floating anglesite. If $PbCO_3$ powder, c.p. is substituted for $PbSO_4$, similar results are obtained.

Acknowledgments

The author is indebted to the University of Alabama Research Committee and the Alabama State Mine Experiment Station for jointly sponsoring this project.

TABLE 4

Test No.	Mineral	Slime and/or cond. reagents. Cond. time 30 sec.	Air Bubble Induction Time	Contact Angle	Mineral Surface Description	Observation of Slurry: Deep Cell	Observation of Slurry: Shallow Cell
1	Galena	1% $BaSO_4$ 50mg/l et x 3.75 g/l $Na_2SO_4.10H_2O$	20 sec.	61 ±1	Lt. Slime Coating	Brownian Movement	Brownian Movement
2	Sphalerite	1% $BaSO_4$ 50mg/l et x 3.75 g/l $Na_2SO_4.10H_2O$	5 min.	0°	Lt. Slime Coating	Brownian Movement	Brownian Movement
3	Pyrite	1% $BaSO_4$ 50mg/l et x 3.75 g/l $Na_2SO_4.10H_2O$	20 sec.	60° ±1.5°	Lt. Slime Coating	Brownian Movement	Brownian Movement
4	Galena	1% $BaSO_4$ 200mg/l $PbCl_2$	5 min.	0°	Clear	Brownian Movement	Brownian Movement
5	Galena	(a) 0.1% Na_2S* (b) Helium* bubbled 30 min. in 1% $BaSO_4$ slurry	5 min. *Conditioned Successively	0°	Very Lt. Slime	Brownian Movement	Brownian Movement
6	Pyrite	as in (5)	5 min.	0°	Lt. Slime	Brownian Movement	Brownian Movement
7	Sphalerite	as in (5)	5 min.	0°	Clear	Brownian Movement	Brownian Movement

TABLE 5

Test No.	Mineral	Slime and/or cond. reagents. Cond. time 30 sec.	Air Bubble Induction Time	Contact Angle	Mineral Surface Description	Observation of Slurry: Deep Cell	Observation of Slurry: Shallow Cell
1	Galena	No slime (a) 3.75 g/l $BaCl_2$* (b) 50mg/l et x* Sat. $BaSO_4$ solution	15 sec.	61° ±2°	Clear	.....	.....
2	Galena	1% $BaSO_4$ 3.75 g/l $BaCl_2$ 50mg/l et x	5 min.	0°	Medium Coating	Brownian Movement	No Brownian Movement

*Conditioned successively.

TABLE 6

Test No.	Mineral	Slurry and/or cond. reagents 30 sec. cond.	Mineral Surface
1	Galena	1% $BaSO_4$ 50mg/l et x	Med-Heavy Slime Coating
2	Galena	1% $BaSO_4$ 2,000mg/l et x	Med-Heavy Slime Coating

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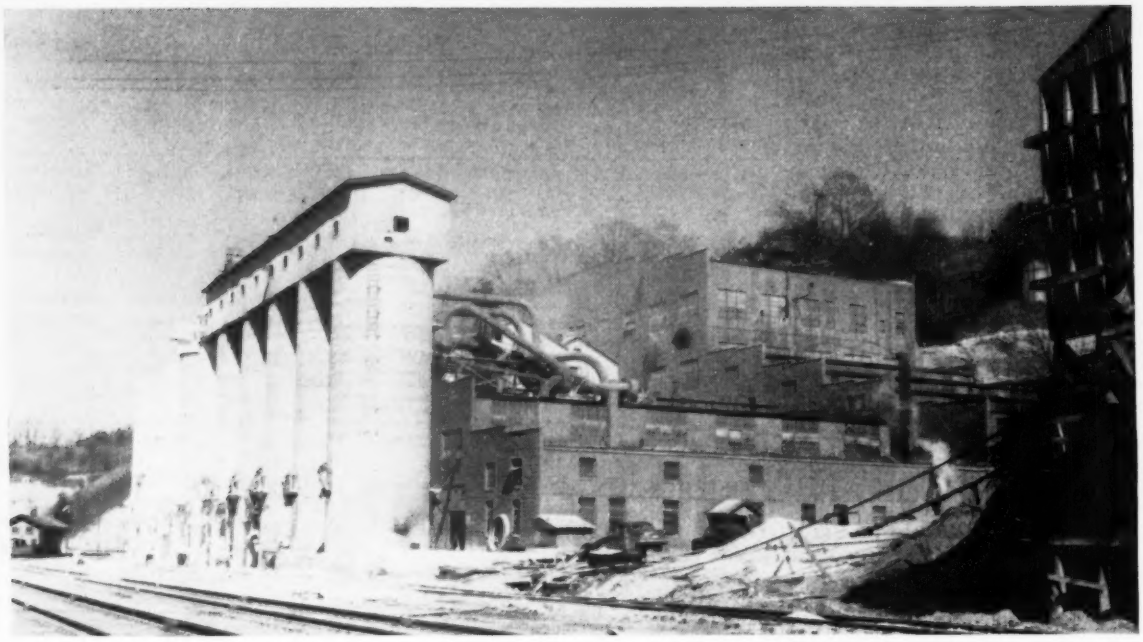


FELDSPAR PLANT at Kona, N. C., produces both glass and pottery grade feldspar as well as a mica concentrate and flint. It is one of the few plants in the U. S. to produce glass spar directly from flotation.

Kona Plant Features Flexibility

For the first time, a company with long experience in the flotation of feldspar shows how it is done.

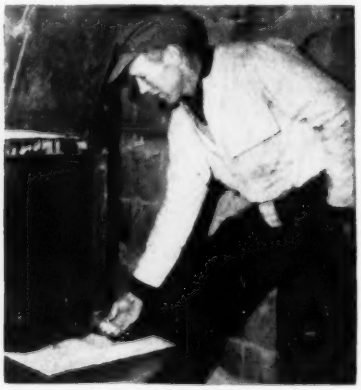
GEORGE P. LUTJEN
Associate Editor

NESTLED IN THE PICTURESQUE mountains of western North Carolina is the town of Kona, which is really part town and part feldspar plant. The plant, acquired last year by International Minerals and Chemical Corp., treats from 700 to 800 tons of alaskite ore a day from adjacent quarries, to produce several grades of feldspar, flint, and a mica concentrate (see Table I). It is one of the few plants in the country to produce a glass feldspar by flotation.

Crude ore at Kona contains 11.5 to 13% Al_2O_3. From this each day are produced about 250 tons of glass or pottery spar, about 120 tons of flint (glass sand) and about 20 tons of mica concentrates.

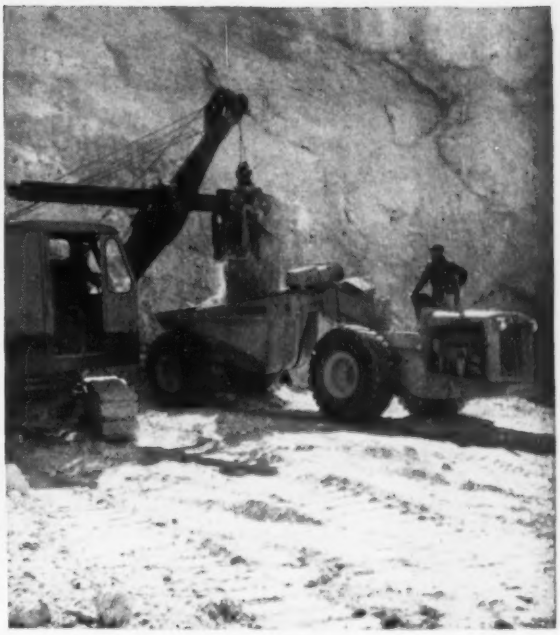
R. W. LAWSON, General Manager, has headquarters in Erwin, Tenn.

E. W. KOENIG, Technical Director, of Consolidated Feldspar Div.



T. T. LAWSON, Superintendent of the Division's plant at Kona.

WINTER QUARRY is mined when high water halts transportation from larger quarry across river from plant.



TOURNAROCKER has just been added to four Dumpsters and one 7-yd. Euclid for hauling ore to the plant.

in Feldspar Flotation

Mining

Feed for the plant comes from the company's summer and winter quarries. The summer mine is across the South Toe River from the plant and holds the bulk of Kona's ore reserves, but low water bridges make transportation difficult when the river is high during the winter. At that time operations move to the winter quarry right next to the plant.

Mining is relatively simple. Wagon drills put in 40-ft. lifters and 30,000 to 40,000 tons of ore are brought down in a single blast. Secondary blasting is negligible and 48-ft. lifters may soon be tried. One shift at the mine keeps the plant well supplied with feed.

So far, selective mining has not been necessary.

Three ¾-yd. shovels, one a spare, load the entire mine output. Transportation is taken care of by four Dumpsters, one 7-yd. Euclid and a newly acquired Tournarocker.

Run-of-mine rock is fed to a Pioneer jaw crusher which reduces it to 4 in. A 3-ft. Standard Symons crusher further reduces mill feed to ⅝ in. From there the rock moves to storage bins or a 5,000-ton stockpile.

Flotation Plant

International Minerals is to be congratulated on obtaining a well integrated, well run plant. The flotation section itself has just been rebuilt and all Denver cells installed. The flowsheet (page 94) is fairly straightforward, but here are some of the highlights pointed out by the plant men.

Grinding: Three rod mills, using lifters and carbon steel rods grind all the ore. The variation in tonnage handled by the mill (700 to 800 tons per day) depends directly out by the plant men.

Desliming. Two 60-in. Wemco spirals in series are required for desliming the ore. According to E. W. Koenig, technical director, the company would use another if they had it. N-Brand silicate is used in the mills to help disperse the slimes.

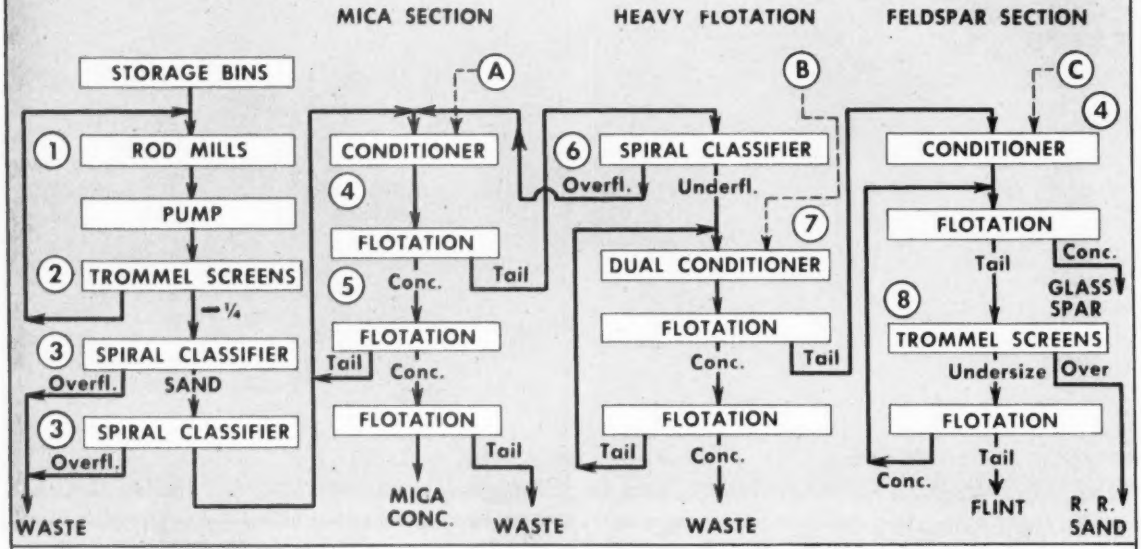
Mica circuit. It is important to remove all the mica in the mica rougher circuit even if a little feldspar and quartz are lost in doing so. The mica is cleaned in the next bank of cells and recleaned in others, with tails going to waste. The concentrate is pumped to nearby New Dale Mica Co., a subsidiary, or dewatered in a drainage bin and shipped to the company's plant at Erwin, Tenn. About 3% of the plant's original feed is recovered as mica.

(No filters are being used anywhere in the Kona plant.)

Table I—Products of the Kona Plant

Glass spar	99.5% pass 20 mesh	
	19.2%	Al_2O_3
	11% Alkalis as oxides	
	0.10% (max)	Fe_2O_3
Pottery spar	99.5% pass 200 mesh	
	20.5%	Al_2O_3
	11.5% Alkalis as oxides	
	5.0% (max) Free Quartz	
Glass sand (Flint)	Ground through 40 mesh	
	0.3% (max)	Al_2O_3
	0.02% (max)	Fe_2O_3

INTERNATIONAL MINERALS & CHEMICAL CORP.
CONSOLIDATED FELDSPAR DIV., KONA, NORTH CAROLINA

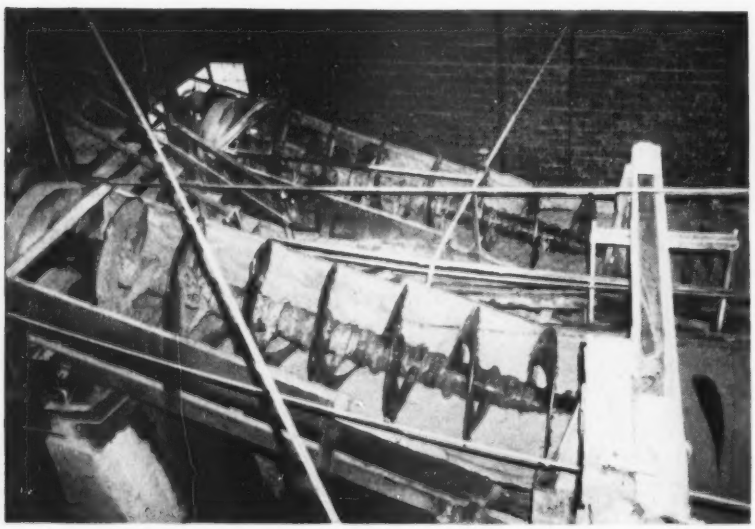


LEGEND

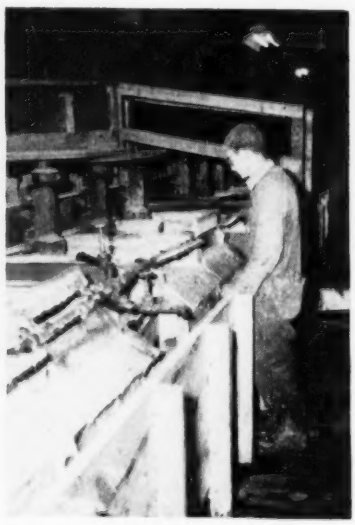
1. Three 5 x 8-ft. rod mills.
2. Six 36-in. x 8-ft. trommel screens.
3. 60-in. Wemco spiral classifier.
4. 4 x 4-ft. conditioning tanks.
5. All flotation cells made by Denver Equipment Co.
6. 30-in. Wemco spiral classifier.
7. Two 4 x 4-ft. conditioning tanks.
8. Two 30-in. x 8-ft. trommel screens.

REAGENTS

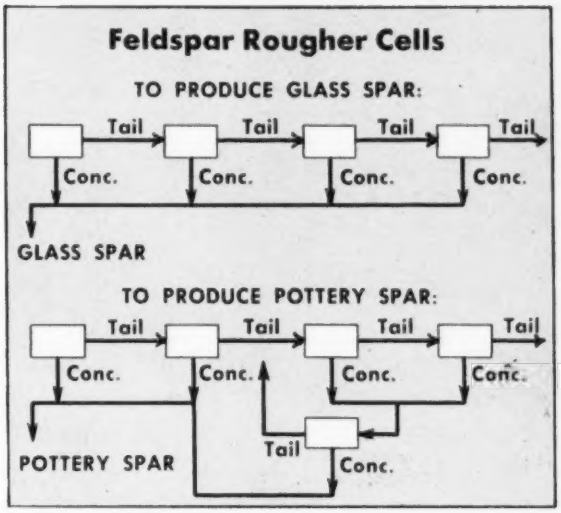
(A)	(B)	(C)
Amine	ODL 801	Amine
H_2SO_4	ODL 825	Hydrofluoric Acid
Shell Methyl Isobutyl Carbonyl (MIBC)	H_2SO_4	Shell MIBC
Fuel Oil	Fuel Oil	Fuel Oil
	Aerofloat	



DESLIMING is a big problem in feldspar flotation. At Kona, two 60-in. Wemco spiral classifiers do the job. N-Brand silicates are used to disperse slimes.



ROBAH THOMAS, flotation operator, keeps an eye on feldspar rougher.



VERSATILITY is reflected in the arrangement to produce glass or pottery spar in feldspar rougher.

CONTROL of operations depends at least 50% on the lab. Here Dewey Holt, Jr., checks centrifuge.

"Heavy" separation. Conditioning is the key to floating the "heavy" constituents in the feed—garnet, tourmaline, horneblende and abraded iron. For conditioning, a dual unit is used giving a retention time of 10 to 12 minutes for complete mixing of the sulphonated oil with the unusually high density pulp.

Feldspar section. Plant versatility shows up in this section. The feldspar rougher can produce a glass grade spar directly, or by altering the flow according to the diagram above, produce a pottery grade spar.

Proposed regrind. Oversize tails from the feldspar rougher are now being sold as commercial sand. Management is considering a regrind circuit to handle these tails. This would throw a greater amount of feed into the flint cleaner in this section. The cleaners would operate more efficiently than they do at present with a small load, yielding more flint as well as returning more feldspar to the rougher.

Control. Control of operations is divided almost 50-50 between operators' observations and a well-equipped, well organized laboratory. The lab works three shifts and is geared to give the day's analyses by noon of the following day. Operators can pretty well tell when to adjust reagent feed, and sometimes must do so two or three times per shift. Some bad operating conditions are hard to spot. For instance, it's difficult for an operator to detect when too much flint is going over with the feldspar. Close analysis, in this case, depends on the lab, but for practical operation, the men run on the bare edge of having feldspar with the flint.

Feed and overflow at the desliming classifiers are automatically sampled and screen analyses run. Mica circuit and "heavy" separation tails and concentrates are sampled by hand and analyzed for iron. "Heavy" tails are also checked for Al_2O_3. Feldspar tails and concentrates are automatically sampled.

DUAL CONDITIONER is necessary for mixing sulphonated oil with high density pulp prior to floating heavy minerals. Retention time is 10-12 min.

Dry milling. All products, except the mica concentrate pumped to the New Dale plant, are dewatered in a series of concrete drainage bins designed at Kona. No filtering is done. After dewatering, spar and sand go to the driers. A Louisville drier handles the pottery and glass spar; a Link-Belt unit dries the flint or glass sand; and a Christy drier is maintained as a standby unit.

Grinding to standard product sizes is done by Hardinge Tricone mills in the dry plant. Glass spar must be 99.5% through 20 mesh. Pottery spar 99.5% through 200 mesh. Glass sand (flint) is ground through 40 mesh.

A PLAN . . . **. . . DEVELOPS FROM TESTIMONY**

BARRY M. GOLDWATER, Arizona, has presented a bill (see text) to block Communist influence in unions. John J. Rhodes, Arizona Congressman, wrote an identical bill.

CHARLES R. KUZELL AND DENISON KITCHELL, of Phelps Dodge, speak for American Mining Congress at Senate hearings, point out evils of violence, mass picketing.

How To Handle Red Unionists

Washington maps new moves to break Communists' grip on U. S. unions like nonferrous Mine Mill and Smelter Workers

JOSEPH M. GAMBATESE
McGraw-Hill Washington Bureau

CONGRESS MAY COME UP with a new way to rid unions of Communist influence. Clinging grimly to their last strongholds in longshore, electrical, communications, and nonferrous mining unions, U. S. Communists defy both government and right-wing union drives to dislodge them.

The heat is about to be applied with quite some steam behind it.

Congress has ample evidence that making union leaders sign non-Communist affidavits (in order to get the protection of the Taft-Hartley Law) has not been an effective deterrent to Communism in union leadership.

A good part of the testimony given recently in Washington before Congressional committees dealt with that point. Both House and Senate Labor Committees, in separate hearings held last month, heard mining industry leaders (see above) tell what Communist influence had done, and could do, in this country's unions.

As a result, Congress has about made up its mind to drop the affidavit requirement and instead put real teeth into Taft-Hartley's bite on Communist labor leaders. Separate bills introduced by Senator Barry M. Goldwater and Representative John J. Rhodes, both of Arizona, are aimed at this objective. They are described elsewhere in this article.

As testimony showed, all of the left-wing union leaders have signed affidavits, including Harry Bridges, West Coast longshoremen's leader, and Maurice E. Travis, mastermind of the radical Mine, Mill and Smelter Workers.

Australian-born Bridges was convicted of lying about Communist affiliation when he applied for American citizenship. His appeal is before the United States Supreme Court. Travis admittedly resigned from the Communist Party only so he could swear he was not a Communist at the moment, but stated publicly that he did so with regret.

Some 232,000 affidavits, signed by officials of 25,900 local and national unions, are on file with the National Labor Relations Board. About 300 of doubtful validity have been referred to the Department of Justice for investigation and possible prosecution for making false statements to obtain a benefit from the government. They included affidavits of Bridges and Travis.

This Is The Record On Communist Influence

Here is a list of major articles that have appeared in *Engineering & Mining Journal* on the subject of Communist influence in the metal mining industry. They trace a record that is unmistakable.

1. "Communism Menaces the Mining Industry," July, 1947
2. "Taft-Hartley and the Miner," December, 1947
3. "Why Deal With a Union Influenced by Communists?" May, 1948
4. "Communists Still Threaten Metal Mine Labor Relations," April, 1949
5. "Mine, Mill vs. CIO Fight Means Turmoil for Mining," April, 1950
6. "The Carlsbad Strike," April, 1950

THESE MEN GAVE ON COMMUNISM IN UNIONS

RUFUS G. POOLE, speaking for potash companies, tells of Mine, Mill's Carlsbad strike in 1950 that served nothing but Moscow line. Aim was to disrupt supply of fertilizers.

RICHARD C. BERRESFORD, New Jersey Zinc Co., described turbulent 15-month strike in New Mexico, now the subject of a left-wing movie aimed at stirring ill-will.

NLRB tried to crack down on leaders of three left-wing unions who refused, before a New York Federal grand jury, to identify their signatures on a non-Communist affidavit or to reaffirm their disinterest in Communism. It ordered these leaders to reaffirm their affidavits under penalty of disqualifying their unions. The Board was prepared to take the same step against officials of Mine-Mill who balked in similar fashion at Senate Internal Security Subcommittee hearings at Salt Lake City last October.

The Board was blocked by Federal Judge F. Dickinson Letts of the District Court in Washington. Judge Letts, granting an injunction against NLRB's action requested by the unions, held that the Board had no authority to inquire into the truth of the affidavits. NLRB has appealed his findings to the higher courts.

Meanwhile, the first active move came when international representative Clinton E. Jencks, a Mine-Mill official, was arrested last month by the FBI for signing a false non-Communist affidavit. His indictment came shortly after Warren Olney, III., new Assistant U. S. Attorney General, promised "more arrests" of Communist union leaders. Jencks was arrested at Silver City, N. M. He is a former president of Mine-Mill Local 890, which struck the Empire Zinc mines for 15 months.

Jencks refused to tell a Congressional committee last October whether he joined the Communist Party in 1940 and whether, in 1946, he had been elected a member of the party's Colorado state board. The false affidavit allegedly was signed in 1950.

Despite Jencks' indictment, Olney told the Senate Labor Committee the non-Communist affidavit is not effective and criticized the Goldwater-Rhodes Bill (see page 100) as too slow.

It is up to the Department of Justice to prosecute those who give false oaths. This agency's explanation has been that this section of the law is worded badly. Conviction, the Government attorneys say, requires proof that the union official was a Communist or believed in Communism on the very day he signed the affidavit. It is not enough to show he was a Communist the day before or after.

Serious study has been given to the question: Does an employer really have to bargain with a Communist union?

Rufus G. Poole of Washington, attorney for the potash companies whose mines at Carlsbad, N. M., were struck for more than two months by Mine-Mill three years ago, disclosed at House Labor Committee hearings recently that he took it up with NLRB attorneys. They seemed sympathetic to his view that the potash mines should not have to knuckle down to Mine-Mill, he said, but explained that NLRB's hands were tied because of the language of the law. It was up to the Department of Justice. NLRB sent its file on Travis to Justice, but the Attorney General took the position that, because of

Senator Goldwater—Representative Rhodes

Both Sen. Barry M. Goldwater and Rep. John Jacob Rhodes, who sponsored the identical bills for controlling Communist-dominated unions, are Republican newcomers in Congress. Both hail from Arizona, the country's largest producer of copper. Hence their special interest in Communism, with which the Mine, Mill and Smelter Workers is infested.

Sen. Goldwater, 44, president of Goldwater's department store at Phoenix, scored a major political upset last fall when he defeated the Senate Democratic majority leader, Ernest W. McFarland. During the war he was, as a lieutenant colonel in the United States Air Force, seeing service in India. He served two terms in the Phoenix City Council and, in 1950, managed the successful election campaign of Gov. Howard Pyle. He is a member of one of Arizona's first families.

Rep. Rhodes, also an Air Force lieutenant colonel and a pilot in World War II, is only 37 and hails from Mesa, Ariz., where he was president of the Mesa Chamber of Commerce. A native of Kansas, Rep. Rhodes became attracted to Arizona during his war service in the state. A graduate of Harvard Law School, he practiced law in Mesa.

How Would You Spot Communists?

Under the Goldwater-Rhodes bills, an officer or employee of a union would be deemed a Communist labor representative if he:

1. Advocated, aided or supported "the advancement of the economic, international, military, and governmental doctrines, policies, or aims of the world Communist movement."

2. Knowingly aided or supported any Communist-action or Communist-front organization, any Communist foreign government or any organization listed as subversive by the Attorney General.

3. Instigated or encouraged strikes, slowdowns, or other interruptions of work to aid the Communist movement or a Communist foreign government.

A union would be deemed a Communist labor representative if:

1. It operated, even in part, as a vehicle for promoting or publicizing and advocating the policies and aims of Communism.

2. It gave aid and support to any Communist foreign government or Communist-front organization.

3. Any Communist labor representative is an officer or employee of, or is influential in formulating the policies of, the union.

Mine-Mill Ducks Committee Hearings

Mine, Mill and Smelter Workers leaders were asked by the House Labor Committee to testify on Taft-Hartley amendments. Instead of appearing and being available for questioning by committee members, written statements were filed.

The statements were in the names of Secretary-Treasurer Maurice E. Travis, an admitted ex-Communist, and Vice President Orville Larson. Both refused last October to tell the Senate Internal Security Subcommittee whether they were Communists or even admit that they had signed the non-Communist affidavits under Taft-Hartley.

The House Labor Committee considered forcing them to appear for questioning under subpoena.

The Larson statement covered the non-Communist affidavit question. It stressed freedom and democratic principles, particularly freedom of the union membership in the choice of their leaders. It said in part:

"We understand that many proposals have been made to further limit the choice of workers to select and elect their own leadership by the setting up of subversive activities boards, and the like, to question and disqualify individuals from accepting elected posts in leadership.

"We have been in existence for some 60 years. Throughout that entire time, no member of our union has ever been questioned as to his race or color, his religious beliefs, or his political, social, or economic view.

"We are not afraid of our democratic processes. We have confidence in the intelligence and ability of our membership to choose leaders who they think can best carry out the program they themselves formulate.

"Freedom of choice of bargaining representatives to remain so must contain freedom of choice of leadership."

How Would You Control Communism in Unions?

These are some of the major suggestions, in addition to the Goldwater-Rhodes approach, made to Congress for handling the problem of Communist influence in unions.

George Meany, AFL president—drop the affidavits; strengthen the ability of the Department of Justice and other federal agencies to "remove Communists and Communist agents from our strategic facilities."

Philip Murray, late CIO president—the government should use its present security powers to screen out of defense industries those who might seek to aid the Communists by committing sabotage. If the government tries to determine what unions can represent workers, it will have embarked on the long trail toward government control of unions.

A. Devitt Vanech, deputy attorney general (in 1952)—union leaders should be required to swear, annually, that they have not been connected with Communist activity for a year. NLRB should not certify a union that is Communist dominated or controlled.

Paul M. Herzog, NLRB chairman—drop non-Communist affidavits; let some agency like the Subversive Activities Control Board investigate Communist leadership unions. When a union is found to be Communist-dominated, NLRB should deny the union bargaining rights.

National Association of Manufacturers—no employer should recognize voluntarily, or be required to recognize, or even deal with any union lead or dominated by a Communistic group.

Walter P. Reuther, CIO president—drop the affidavit; if employers will stop "playing footsie" with Communist unions, the non-Communist unions can win the workers away from the Communist unions. No legislation recommended.

American Mining Congress—some government agency should identify a Communist-dominated union and deny the union any status as a labor organization if it does not get rid of the Communist leaders (the Goldwater-Rhodes approach).

U. S. Chamber of Commerce—strengthen the non-Communist oath for union leaders; permit employers to discharge Communists and unions to expel them from membership; no objection to making employers sign affidavits, too.

Albert Hayes, president of AFL Machinists Union—the affidavits should be dropped. Congress should outlaw Communism and Fascism. Unions should be allowed to force the discharge of employees who are Communists or Fascists.

Rep. Augustine B. Kelley, Democrat, of Greensburg, Pa.—no union should have access to NLRB unless its constitution bars Communists from membership.

David J. McDonald, President CIO Steelworkers Union—favors dropping affidavits or limiting to International union officers only. (Steel union now files 24,000 affidavits yearly). Give Taft-Hartley rights only to unions whose constitution bars Communists from office.

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the way the non-Communist affidavit section of Taft-Hartley is worded, it was "highly doubtful" whether an indictment could stick.

As a result, Poole could not advise the potash companies not to bargain with Mine-Mill. They might have an unfair labor practice strike on their hands and then have to pay wages for work time lost.

Poole disclosed these events when a member of the House Committee, Rep. Charles J. Kersten of Milwaukee, a Republican, asserted that a company would be "in a very solid position legally" to refuse to deal with Mine-Mill. Kersten relied on the premise that Travis obviously had not abandoned his belief in Communism when he resigned the party reluctantly.

Another committee member, Rep. Stuyvesant Wainright, Long Island (N. Y.) Republican, commented that the committee "would be terribly interested" in any written ruling by the Attorney General on Travis' situation. Wainright was a captain in Army Intelligence during the war. He headed some units of the Office of Strategic Services for the First Army.

It was generally agreed in recent discussions on Capitol Hill that Communist union leaders do not hesitate to lie about their Communist sympathies. By signing the affidavit, without punishment, they turn this intended federal restriction against Communist influence in unions to their advantage. They point to the affidavit and lack of prosecution as real proof that they are not Communists.

Moreover, they use this government-approved bargaining status to foment strikes and other labor troubles for political rather than economic objectives, witnesses testified.

Poole described in detail for the House Committee, the violence, road-blocking, disrespect for the courts, and other Communist tactics employed by Mine-Mill in the Carlsbad potash strike. Mine-Mill maintained a state of disorder in the Carlsbad area for two months before giving up the strike, supposedly for a 25¢ wage increase. They did not get the increase, but they cost the country a loss of several hundred thousand tons of potash needed for fertilizer. Potash was in short supply at the time. This was ascertained by Mine-Mill from the Department of Agriculture before the strike, Poole said. Two other unions, the AFL Machinists and Electricians, has settled their disputes with the same mines without a strike.

Empire Zinc Strike

A similar story of Mine-Mill's turbulent 15-month strike at the Empire Zinc mine at Hanover, N. M., near Silver City, ending in January, 1952, was recounted for House Committee members by Richard C. Berresford, manager of employee relations for New Jersey Zinc Co. owners of the mine.

The method used by Mine-Mill at Hanover "savors of a higher strategy for a destructive purpose," Berresford said.

"We feel that the question of Communism is the basic one here," he continued.

"No strike involving so few men, and over the particular issues, could, in our opinion, reasonably have lasted so long if it had not become endowed with a higher strategy."

Berresford suggested that this possibly is confirmed by trouble that Mine-Mill went through to make a movie, "Salt of the Earth," at Silver City despite protests and interference from local citizens and authorities. The movie, involving the Mexican racial issue, was directed by suspected Communists.

There were only 120 employees involved in the strike, but pickets at the beginning numbered as many as 220. Before the strike began, the company put into effect a wage increase it had offered before bargaining on a new contract became deadlocked.

Attention of the committee was also called to similar disruptive behavior by Mine-Mill in the 1948-49 strike against American Zinc, Lead and Smelting Co., Metaline Falls, Wash.; Fairmount City and Hillsboro, Ill., and Columbus, O.

What To Try Next?

Such is the record, laid bare, of how the non-Communist affidavit, Section 9(h) of the "Labor Management Relations Act, 1947," has failed in its objective. Except for the left-wing union leaders it seems to protect, the verdict is unanimous, from the law's co-author and staunch supporter, Sen. Robert A. Taft, down to its bitterest foes.

What is the remedy?

Here agreement ends. Almost everybody seems to have a different idea about how to correct the situation. They cover a wide range: Drop the affidavit entirely and help non-Communist unions do the job. . . . Put teeth in the affidavits. . . . Make organizers sign. . . . Break up any union that is Communist-dominated. . . . Penalize employers who deal with such a union . . . and others.

Taft had an idea of extending the affidavit requirement to employers. In fact, one of the amendments to Taft-Hartley he has introduced would do just that. But this was simply one of several steps the Ohio Senator suggested to help balance the law by making the affidavit requirement apply equally to employer and union leader.

Taft now realizes this step would not even begin to touch the problem. Communist union leaders would still sign affidavits as before. So he has changed his mind in favor of some method of identifying those unions that are under Communist domination and denying them any union rights.

Even the labor leaders who have testified agree it would be useless to ask employers to swear they are not Communists.

Criticizing the affidavit for union officials as "not the effective way to deal with the problem," Walter P. Reuther, the new CIO president, told the Senate Labor Committee that "extending it to employers is not going to make it more effective."

Senate and House committees heard suggestions mostly from management, that organizers, international union representatives, non-employee members of negotiating committees, and other lesser union agents should sign affidavits and that the penalties for false oaths should be more easily enforceable.

"These (union) agents seldom stay in one place very long," Poole told the House group. "Where they come from and where they go is often a mystery."

"In the case of Mine-Mill, many of these representatives or agents have a long history of association with subversive organizations. The CIO was convinced that approximately 90% of the Mine-Mill "staff members" were members of the Communist Party.

"They are clever. They are about as smart a group as you will find in the union movement in this country. They are trained as economists and they are masters of propaganda and they know a little law.

"They will come into a situation like Carlsbad and completely dominate it. And frequently, it is a matter of mystery who they are, where they come from, and where they go after they leave.

"They will show up later, not infrequently in other international unions that also have a subversive record, because I have run into them."

Affidavits No Answer

Simply making more union agents sign the affidavit and penalizing those who swear falsely is not the answer either, it seems agreed. That is mainly because a left-wing union could continue to function without filing affidavits, just as the non-Communist United Mine Workers and the International Typographical Union have done.

Failure to file affidavits only denies a union the right to participate in bargaining elections or to bring unfair practice charges against an employer. Under such circumstances a willing employer could continue to deal with a Communist union, or, where he refused, such a union could still strike for bargaining recognition. In the latter situation, the employer would be helpless unless another union, in compliance with the law, stepped in and was able to get bargaining rights through support of the rank and file.

Reuther, who took on the Communists in fighting his way to the top of the CIO United Automobile Workers in 1946, dwelt at length on this point. He told the Senate Committee some mining companies were "playing footsie" with Mine-

How To Handle Red Unionists *(Concluded)*

Mill to get softer contract terms, or simply to play one union against another.

Reuther Blames Employers

"I call your attention specifically to the whole history of the copper situation, the Anaconda Copper strike," Reuther said. "Get the facts and the background of that and see how that was maneuvered as it related to the Mine, Mill and Smelter Workers, which in our opinion is a Communist-dominated union."

Reuther's recommendation is that the affidavits be dropped and nothing else substituted in its place. He would leave it up: (1), to employers to stop "playing footsie" with Communist unions; and (2), to non-Communist unions to "aggressively push their drive to win away the workers from the Communist-dominated unions."

"A combination of these two factors will do the job," he says, adding that non-Communist unions must "go in there and outwork and outfight, and outtalk and outmeet the Communists and beat them in their own backyard."

The CIO chief asserted, in answer to a question from the liberal Sen. Paul Douglas of Illinois, that the Steelworkers had lost elections in some smelters because the managements favored Mine-Mill "when the strike was on." He hinted that the Steelworkers would "have to go back" and try over again.

Congress apparently is in a mood to go further than just decertifying a Communist-dominated union. House Committee Chairman Samuel K. McConnell, Jr., of Pennsylvania, feels "undoubtedly" this must be done.

Berresford suggested that any contract with a left-wing union might be declared void. Committee Counsel Edward A. McCabe asked what could be done with a company that decided to deal with a Communist-dominated union anyhow. Berresford's answer was that, in time, the left-wing union would be replaced by a qualified union because it would be dealing with the employer only on an oral basis, "and most informally," with no power to bring up grievances, file charges, and the like.

McCabe tossed out the idea that a company which deals with a left-wing union in one of its plants might be disqualified to use the Taft-Hartley Law in any of its other plants.

Berresford said he would favor penalties, if necessary, to make it outright unlawful for an employer to deal with a union found to be Communist-dominated.

Witnesses for the American Mining Congress, Charles R. Kuzell, general manager of Phelps Dodge, and Denison Kitchel of Western Counsel for P. D., joined Poole and Berresford in pleading for strengthening of the non-Communist affidavits for union officials. The entire mining group also endorsed the identical Goldwater and Rhodes bills, S. 1254 and H.R. 3993, under which unions found by the Subversive Activities Control Board to be under Communist influence would be put out of business. The industry spokesmen would like the affidavits retained to serve as a check until the Goldwater-Rhodes plan has a chance to take hold, if it becomes law.

The Utah Mining Association, through its manager and secretary, Miles P. Romney, also joined in the recommendations. In answer to a question, Romney agreed that Communist control of a union at the top, even with non-Communists running the locals, constitutes a danger.

"At strategic times when it would be to the advantage of Communistic people to cripple our industry," Romney said, "there is a very definite threat of danger in such domination of the union."

Some experts, including the Department of Justice, have urged that Congress simply treat Communist unions like "company" unions; that is deny them bargaining status. Such a development occurred in Canada, where the Canadian Labor Board ruled that a Communist-dominated seaman's union was not a legitimate trade union and denied it any recognition.

Congress May Act

But it is the Goldwater-Rhodes approach that appears to have strongest appeal in Congress and something along that line will likely pass. The mining industry and others prefer it over the McCarran bill, which makes it unlawful for a Communist to hold office or a job in a union and permits employers to discharge subversives. (The McCarran bill is lying idle in the Senate Judiciary Committee.)

The Goldwater-Rhodes idea was suggested more than a year ago, by L. R. Boulware of General Electric Co., to the Senate Labor-Management Relations Subcommittee headed by Sen. Hubert H. Humphrey of Minnesota. The House Committee on Un-American Activities also urged abandonment of the affidavits as useless and asked that some independent agency be used to put the finger on the Commie unions.

Humphrey, himself, a pro-labor Democrat, warns that "we should not blink our eyes" to the dangers of sabotage that might be committed in the mining and smelting industry in a period of threatened war. But he has no specific recommendation for catching up with the Communist union leaders.

The Goldwater-Rhodes idea has some labor backing, too. Roy M. Brewer, international representative of the AFL Theatrical Stage Employees and Motion Picture Machine Operators, who has come face to face with the problem in Hollywood, favors it.

Plan Takes Shape

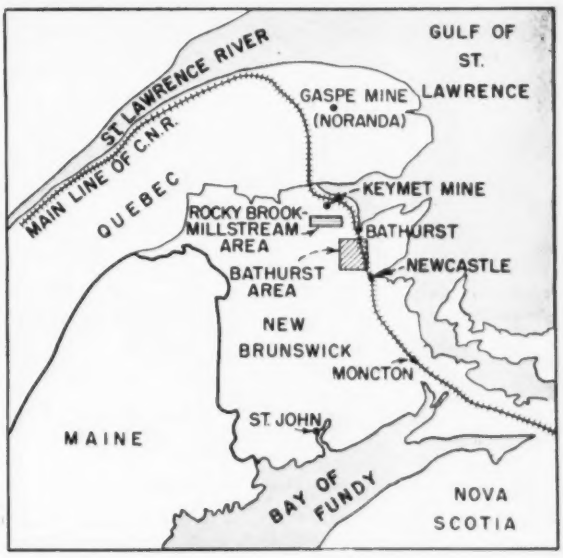
What the Goldwater-Rhodes bill would do is this:

Let the Subversive Activities Control Board, set up under the McCarran Internal Security Act of 1950, take on the additional duty of determining whether or not a union is Communist-dominated. It could utilize panels of retired Federal jurists for this purpose. When a union is found to be under Communist influence, the board would issue an order, enforceable in court, preventing the union from representing employees.

The union would be denied any of the privileges and protection granted by the Taft-Hartley Law. Activity by an employee in behalf of such a union would not be a "protected activity," meaning that workers could be fired or otherwise disciplined for it. The union, further, would lose exemption from anti-trust prosecution and the protection of the Norris-LaGuardia Anti-Injunction Act. Employers could obtain federal court injunctions against the unions under justifiable circumstances. (Taft-Hartley permits only the government to obtain an injunction, and only in limited situations.) The union would lose its status as a union; it could not make a contract as bargaining agent for workers.

In this bill, Congress seems to have found a far-reaching and effective approach to the Communist problem in unions. It goes all the way.

AEROMAGNETIC ANOMALY over Brunswick property at "A" was ignored when magnetic map was published.[1]



FABULOUS FIND AT BRUNSWICK property set off frenzied exploration boom in Bathurst and other areas.

Huge New Brunswick Metal Find Sets Off Exploration Boom

So near and yet . . .

BRUNSWICK MINING & SMELTING CO.'s big new base-metal orebody, with potential close to 30,000 tons per vertical foot, lies on a property which years ago was the scene of iron mining operations. Its widest part, in fact, is less than 4,000 ft. from the old open pit.

The several former operators, among whom was one of Canada's biggest iron and steel companies, never found the iron ore profitable. The silica content (18%) was too high.

They never guessed that less than a mile away, under a scant 10 ft. of overburden, lay one of the big mining prizes of the century.

They did come close, however. In 1907, searching for other deposits of iron ore, the owners did a little widely-spaced drilling north of the known outcrop. One hole drilled to 200 ft. encountered a small high-silica lens which was not considered commercial. If that hole had been continued another 200 ft., it would have intersected the widest part of the big orebody which this year has changed the whole course of New Brunswick's mining history.

[1] After Aeromagnetic map prepared by the Canada Department of Mines and Technical Surveys as republished in The Northern Miner, Jan. 15, 1953.

CANADA'S NEWEST base metal show, most impressive of its kind in the past two decades, will probably change the mining history of a whole province.

It seems slated, also, to focus new public attention on the northern end of the Appalachian Shield; long known as host to a great store of mineral wealth, but neglected (except for the efforts of a few big companies) for a long time.

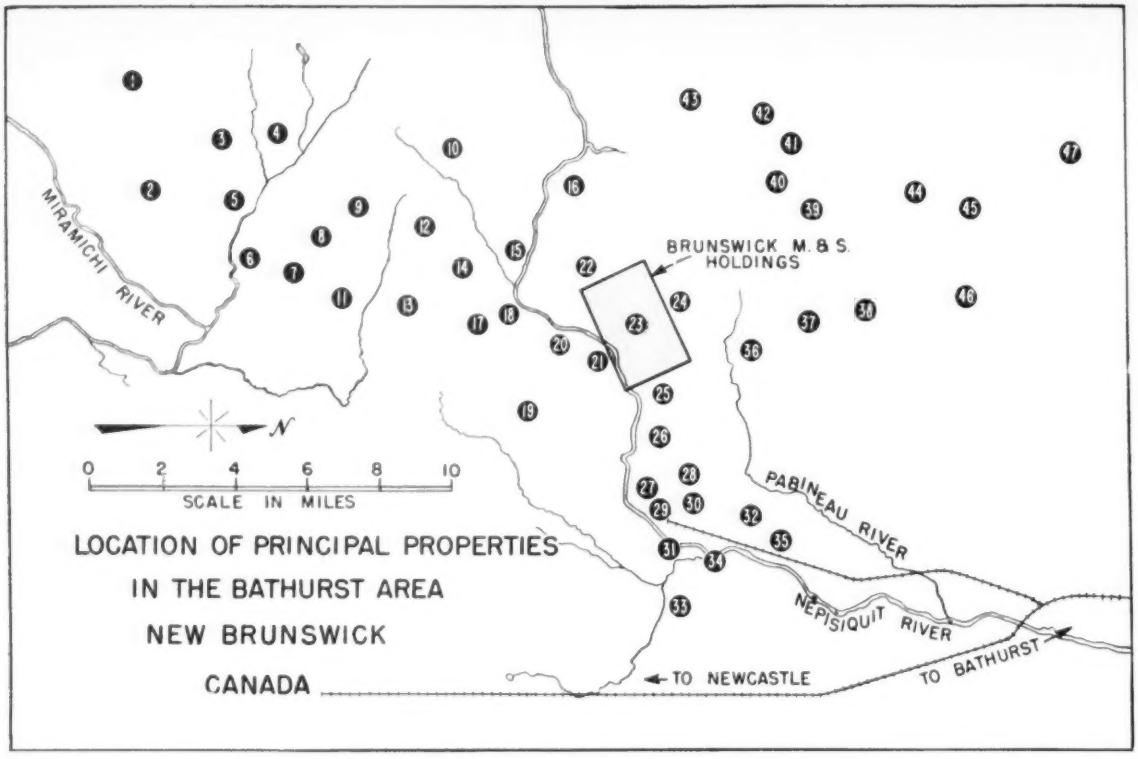
Time must elapse before its potential can be known. In the meantime it is clear that at least one major mine will be established; for Brunswick Mining and Smelting Corp., owner of the known deposit, has in six months outlined by drilling at least 30-million tons with gross value of considerably more than $750-million in zinc, lead, silver, tin, pyrite, and copper.

An open-pit mining operation is visualized with mill capacity of 5,000 tons daily. Profits, needless to say, should be substantial.

Seldom, even in mine-conscious Canada, has a new find fired public imagination to a similar extent. Though it's not yet four months since the news became known, New Brunswick has been the scene of an unprecedented staking rush. Some 30,000 claims have been staked in a frenzied surge that has spread through almost all parts of the province. There has been time yet for exploratory work on only a dozen or so properties; and the coming summer is sure to see a wave of prospecting, surveying, and drilling such as no Maritime province has ever witnessed.

The work will be well warranted. The prizes could be tremendous. The Brunswick mine alone could be big enough to raise New Brunswick a notch or two in its rank among the Canadian provinces. Last year its mineral output, mostly coal, was about $12-million, or not quite 1% of the country's total. It's not difficult to visualize this one mine more than doubling that amount.

The rebirth of interest in New Brunswick really stems from the high metal prices of 1951. The Rocky Brook-Millstream area made modest headlines, and diamond drilling outlined a good ore lens at the Keymet. However, no great boom materialized, and interest had pretty well subsided last year when M. J. "Jim" Boylen, president of Keymet, found the Brunswick. Oddly enough, he was looking for iron at the time.



Key to Properties Shown on Bathurst Map

1. Bathwick
2. N. A. Timmins, 1938, Ltd.
3. Roche Long Lac
4. Norsewick
5. Canagau
6. Ladulama Gold Mines, Ltd.
7. N. A. Timmins, 1938, Ltd.
8. Captain Yellowknife Gold Mines, Ltd.
9. Bocabois Gold Mines, Ltd.
10. Ken-Bay Gold Mines, Ltd.
11. Kontiki Lead & Zinc Mines, Ltd.
12. Consolidated Harpers Marlartic G. M., Ltd.
13. Leadridge Mining Co., Ltd. (St. Joseph Lead Co.)
14. Grandines Mines, Ltd.
15. Violamac
16. Coulee Lead & Zinc Mines
17. Ladulama Gold Mines, Ltd.
18. Conwest Exploration Co.
19. New Jersey Zinc Exploration, Ltd.
20. Nubar Mines, Ltd.
21. Bathurst Mining Corp., Ltd.
22. Uddlen Mines, Ltd.
23. Brunswick Mining & Smelting Corp., Ltd.
24. Maritimes Mining Corp., Ltd.
25. New Highridge Mining Co., Ltd.
26. Red Poplar
27. Randona Quebec Gold Mines, Ltd.
28. Batch River Gold Mines, Ltd.
29. Orlac
30. Mayo Mines
31. Landover
32. Macho River
33. United Montauban Mines, Ltd.
34. New Larder "U" Island Mines
35. Brunhurst Mines
36. Fab Metal Mines, Ltd.
37. Leadridge Mining Co., Ltd. (St. Joseph Mining Co.)
38. North Inca Gold Mines, Ltd.
39. Anacon Lead Mines & Leadridge Mines
40. Acadia Uranium
41. Eastmont Larder Lake Gold Mines Ltd.
42. Wesley Gold Mines, Ltd.
43. Celta
44. Harricana Mines
45. Barvallee
46. Keyboycon Mines, Ltd.
47. JacKnife Mines

The old Drummond iron mine was well enough known. Discovery was made in 1902; a deposit of hematite-magnetite 16 mi. south of Bathurst on the Bay de Chaleur. It aroused a lot of enthusiasm at the time, and from 1907 to 1913 some 185,000 tons of ore was shipped to Philadelphia. The ore, however, was high in silica, difficult to beneficiate; and the depression of 1913 closed the mine.

It lay idle then until 1942 when, faced with wartime shortage and the danger of the longer ocean haul from its Newfoundland mine, Dominion Steel & Coal Corp. leased the old pit and resumed mining. A total of 128,000 tons was shipped to its furnaces at Sydney, N. S., before operations again were stopped.

Again the property lay idle, this time for 10 years. Then Boylen, interested in iron, appeared on the scene. He thought that the ore, though siliceous, might be of more value in these iron-scarce days, and sent his engineers in to investigate.

The iron possibilities didn't look impressive, but the searchers noticed something else; indications of sulphides along one side of the old pit. A closer look at old maps and records followed.

The old records disclosed that the presence of lead and zinc, though not in commercial quantities, had long been known. Then a more recent map appeared; one that showed the results of an aeromagnetic survey conducted over the area by the Department of Mines & Technical Surveys in 1950. No one is yet quite sure why the mining industry ignored that map, for it showed a fine and strong string of anomalies, blackest of which was just north of the old iron mine, the others stretching for miles across the country.

An electromagnetic survey was ordered, and it strengthened hopes for that north anomaly. By this time diamond drilling had started on the showing alongside the pit. Some fair holes were obtained, the best one returning a 7-ft. section averaging 7.35% zinc, 4.05% lead, and 2.54 oz. of silver. Hole No. 12 is the one to be remembered. It was put down on the north anomaly, the first hole spotted there. Massive sulphides were encountered at 95.5

FOR REAL HELP TO SMALL BUSINESS

It is ironic that one of the first jobs of the Eisenhower administration, so widely, and erroneously, tagged as a "big business" administration, must be to go to the relief of small business. This is necessary because the preceding administration, while continually proclaiming its tender regard for small business, actually impaired gravely the ability of small business to carry on successfully. This it did in the necessary haste of devising an emergency tax program to finance rearmament and the Korean War. Now the new administration must revise this tax structure to give small business a chance to make its key contribution to an expanding American economy.

How Taxes Hurt Small Business

Since the outbreak of the Korean War, small business has been handicapped by two principal features of the emergency tax program:

1) Many small firms are unable to retain enough of their earnings to provide for expansion because these earnings are drastically limited by the excess profits tax.

2) Small companies have received a very small share of the tax concessions allowed by the federal government to encourage construction of defense facilities.

A small business that succeeds and hence grows is particularly hard hit by the excess profits tax. That tax, of course, applies to corporations having a net income of more than $25,000 per year. It results in taking up to 82 cents on every dollar of profit that the company earns above what is called an "excess profits credit." For most small companies the credit depends on what was earned in 1946-49. This creates an element of gamble and discrimination in determining the amount of tax to be paid. Time has proved that it is impossible to select a base period for the tax that is fair to all companies. A young company starting in 1946-49 is peculiarly vulnerable, as its earnings in that period were necessarily low. Even on modest earnings today, it would pay a high excess profits tax.

It is true that Congress wrote into the excess profits tax law provisions to lessen the impact of the tax on growing companies. However, none of these provisions in practice has given much relief to small business.

"Relief" Provisions Give Little Relief

Small firms rely almost entirely on retained earnings to provide funds for improving their plants and equipment. They get very little help from the provisions (1) that no more than 70 per cent of total profits can be taxed away, (2) that additional earnings are allowed on an increase of invested capital or (3) that growing companies are allowed a

rate of return on capital equal to the industry average.

Most large firms can obtain additional funds in the securities market. But small firms find it difficult to increase their capital by selling securities, since investors generally prefer the stocks or bonds of nationally known and seasoned companies. Few small companies, therefore, can reduce their tax burdens by increasing their invested capital, and few can meet their needs for equity capital if their rates of profit are no higher than those of the leading companies which generally set the average profit.

Small business has been equally at a disadvantage in the matter of accelerated depreciation for tax purposes. The government has encouraged a great expansion of our industrial plant, despite the very high rate of taxation on corporate earnings, by granting certificates of accelerated amortization on new plants built to support the defense program. These certificates allow business to charge off the cost of defense plants at a rapid rate. This decreases the earnings that are subject to taxes, and so increases the part of the earnings that may be retained in the business.

Growth is Stifled

But most of these tax concessions have been made to large firms especially equipped to handle the complex problems of defense production. Of the $12 billion of new facilities so far approved for fast amortization, only 11 per cent are for companies with less than 500 employees, although the share of such companies in the normal civilian business is about 30 per cent. In only 2 of 12 industries studied by the Small Defense Plants Administration were small firms receiving what was estimated to be a fair share of the total tax amortization awarded.

Because they are unable either to retain enough earnings after taxes or to step up their depreciation allowances, most small firms are unable to keep up in the race to expand and modernize plant capacity. The Small Defense Plants Administrator, in his report to Congress, emphasized that small companies have been unable to do their full part in the defense program for lack of capital.

The Council of State Chambers of Commerce recently published an eight-state survey showing widespread cutbacks of plans for new plants by small and medium-sized companies. According to this report, "high federal taxes enacted since the beginning of the Korean War appear to be placing an effective brake on the rate of industrial expansion in all the states surveyed and probably in the 48 states generally . . . It is principally the small and medium-sized companies whose growth is being stifled."

Some Ways to Help

The first step to relieve small companies should be to free them from the excess profits tax. The nation as a whole would be far better off if the excess profits tax were allowed to die as scheduled on June 30, since the tax promotes waste as it stifles incentives. It is quite possible, however, that the politics of tax reduction, as opposed to the economics, will prevent the elimination of the tax during 1953.

If the tax is extended, provision should be made for a much broader exemption to smaller corporations. If net income up to $100,000 a year, which in these days still constitutes small business, were exempted from the tax, the loss of revenue to the government would be about $175 million. This relatively small amount could easily be offset by an increase in employment and incomes if small business is freed from its financial strait jacket and allowed to expand. Careful attention should be given also to the possibilities of allowing a higher rate of return on the first $1 million of capital (roughly the amount it takes to provide 100 jobs) and of making special accelerated depreciation allowances to smaller firms. This is a matter so important that we shall return to it in a future editorial.

Relief for small business—relief from a financial paralysis that has kept it from playing its dynamic part as a growth element in our economy—would do much to give the lie to the notion that the Eisenhower administration is a "big business" operation. Much more important, it would be a long stride toward releasing the dynamic energies of many small businesses and businessmen to forward a continuing and expanding prosperity.

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FIRST — A relatively fine separation was required at low dilution without dispersing agents.

SECOND — Space and headroom were severely limited.

THIRD — The initial cost was lower than for any other type of classification equipment.

Over a three months period, operating data have averaged as follows:

	FEED	OVERFLOW	UNDERFLOW
% Solids	35.9	27.0	61.2
GPM	542	432	110
TPD Solids/unit	1500	842	658
% Recovery		56	44

MESH	CUMULATIVE % PLUS THE MESH		
65	5.3	1.1	15.4
100	15.8	2.6	40.2
150	28.4	6.8	60.1
200	42.9	18.1	75.8
—200	57.1	81.9	24.2

If you have a desliming problem, there's a good chance that the DorrClone, with its high-capacity-for-size and ability to handle flocculant or heavy pulps, will be the solution. For further information write for Bulletin No. 2500, The Dorr Company, Stamford, Conn.

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ft. and the drill was still in them when it was stopped at 370 ft. The core length of 274.5 ft. averaged 3.77% zinc, 1.42% lead, and 1.94 oz. of silver.

Since that time the project hasn't needed a backward look. The only question was how to keep the results a secret while more ground was being staked. The answer to that question is still a mystery. At times, in the weeks that followed, as many as 100 men were employed as stakers; yet somehow the news didn't spread to other parts of Canada. The most plausible explanation is that the crews, unemployed farm hands or lumbermen from the neighborhood with no knowledge of mining, were so elated at the unexpected surge of work that they were delighted to say nothing lest an influx of more workless might shorten the bonanza's duration. Be that as it may the Boylen interests, by mid-January, when the news broke, had staked almost 1,000 claims in addition to the original Brunswick lease.

28,813 Tons per Foot

By that time the drilling had indicated ore officially calculated at 28,813 tons per vertical ft. averaging 5.2% zinc, 1.61% lead, and 1.98 oz. of silver per ton. With slightly lower grade over greater width, the tonnage steps up to 34,533 tons per vertical foot. In addition to the metals listed the ore contains copper, perhaps 0.5%; tin, the presence of which was not noted at first, perhaps 0.2%; and pyrite, of which the cores contain an estimated 80-90%. Gross value at April prices would be several dollars above $30 per ton.

It will probably be close to year-end before enough work has been done to permit formations of detailed production plans; but an open pit operation can be expected with an eventual capacity rate of 5,000 tons. Continuity of ore has already been proved to 1,000 ft. with undiminished width and grade.

Brunswick Mining and Smelting Corp., with main office at 908,330 Bay St., Toronto, and local office at Bathurst, N. B., is capitalized at 5-million shares, $1 par. The vendors received 1,700,000 (partly pooled) and 200,000 shares were quickly oversubscribed at $10 net to the treasury. (They have since been quoted well above $20.) With $2-million on hand, the company was comfortably financed for preliminary work, with time to shop around for the additional millions that will be needed for plant construction. President of Brunswick is M. J. Boylen, while R. J. Isaacs is managing director.

Following is a partial list of companies with properties in New Brunswick, almost all acquired in the past four months. Changes and additions are being made almost daily. It does not include many small syndicates or private stakings which cover thousands of claims in various parts of the province.

Acadia Uranium Mines: Has 21 claims in the Upper Papineau River district and two groups in the Bathurst area west of the Anacon-Leadridge group. Has $170,000 cash with which to finance prospecting this summer.

Algoma Ore Properties Ltd.: Has picked up 250 claims as a straight geological bet about 12 mi. west of the Brunswick mine. Wholly-owned by Algoma Steel Corp., and one of Canada's biggest iron ore producers, the company has plenty of funds. Work will start in a few weeks.

Anacon Lead Mines: Has a 50-50 interest with Leadridge (St. Joseph Lead Co.) in a property that covers one of the best-looking anomalies in the Bathurst area. Lines have been cut, the electromagnetic survey is just about completed, and diamond drilling is being started. Anacon is one of the leading companies headed by M. J. Boylen, pioneer and leading figure in the whole New Brunswick rush.

Anthonian Mining Corp.: Has two groups in the north section of the Bathurst area, and has started surface prospecting. Has $500,000 in cash and securities.

Area Mines: Holds 71 claims a short distance south of the Rocky Brook-Millstream area. Will probably work this season; has plenty of funds to start work.

Arnora Sulphur Mining Corp.: Holds 1,200 acres adjoining Brunhurst on the north in the Bathurst area. Magnetometer survey is in progress. The company has $93,000.

Barvallee Mines: Has a group in the north section of the Bathurst area, and plans to start prospecting as soon as the ground is passable.

Batch River Gold Mines: Another "Boylen" company; has a well located group midway between Brunswick and New Larder in the Bathurst area.

Bathurst Mining Corp.: Holds the ground adjoining Brunswick on the south, and on strike. Line cutting in preparation for geophysical work started some weeks ago. Has $600,000 cash received from sales of 600,000 shares.

Bathwick Mines: A locational bet of 40 claims adjoining the N. A. Timmins group at the south end of the main Bathurst section. Survey crews are already at work, the company having raised $87,500.

Bocabois Gold Mines: Holds claims in the Bathurst area; plans work this summer.

Brunhurst Mines: The former Porcupine Peninsular, re-vamped to acquire well located claims adjoining New Larder on the north. With $190,000 cash on hand, has been drilling for some weeks.

Brunswick Mining & Smelting Corp.: The cause of it all. See main part of this story.

Canagau Mines: Holds 20 claims tieing on the North of the N. A. Timmins property, Bathurst area; finances being arranged for work.

Captain Yellowknife Gold Mines: Another locational group on the main line of structure in the Bathurst area; will prospect this season when finances have been arranged.

Celta Development and Mining Co.: Has 10 claims in two groups west and northwest of Brunswick. With $125,000 on hand, has budgeted $38,000 for work this year.

Consol. Harpers Malartic Gold Mines: Bathurst area prospect of 36 claims, arranging funds for work this summer.

Coulee Lead & Zinc Mines: Controls four groups in various parts of the Bathurst area. With $320,000 cash in the bank, is well prepared for preliminary prospecting.

Eastmont Larder Lake Gold Mines: A Boylen company with ground west of the Anacon-Leadridge show.

Estella Mines: Another B.C. base metal operator far from home territory but comfortably located on a big group in the Meadowbrook area. Will be prospecting in a few weeks.

Fab Metal Mines: Raised $285,000 in short order after acquiring a big property one group away from Brunswick on the north. Diamond drilling contract has been signed.

Frobisher Ltd.: The Ventures exploration subsidiary. See New Larder.

Fundy Bay Copper Mines: Holds two groups in the Meadowbrook area, for work on which finances are being arranged.

Grandines Mines: With 49 well located claims a short distance south of the Brunswick, this Boylen company had no trouble raising $225,000 for preliminary work, which is scheduled for an early start.

Harricana Mines: Has $250,000 cash and a big group in the northern part of the Bathurst area on which to start spending it. Will start surface prospecting as soon as the ground has cleared.

JacKnife Mines: With 13 claims in the north Bathurst area, 12 miles from the Brunswick, has $60,000 for preliminary work.

Ken-Bay Gold Mines: Got in early and staked a property in the Bathurst area off the main line of structure but covering a husky-looking magnetic anomaly. Surface work will start shortly, to finance which the company has $80,000.

Keyboycon Mines: Holds ground in the north section of Bathurst area; is arranging funds for work.

Keymet Mines: A lead-zinc prospect 18 mi. northwest of the town of Bathurst, with shaft to 350 ft. from

(*Continued on page 202*)

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 (*Continued from page 69*)

Summary of Copper Statistics

The following summary of copper statistics covers the operations of most of the Free World's production as reported to Copper Institute. Figures in short tons.

UNITED STATES

Production:	Nov. 1952	Dec. 1952	Jan. 1953	Feb. 1953	Mar. 1953
Crude primary	78,023	81,250	78,124	75,172	82,213
Crude secondary	2,413	3,989	3,501	8,481	17,719
Refined copper	100,075	113,965	108,010	101,538	112,016
Deliveries, refined	125,338	143,088	125,133	117,204	133,462
Stocks at end, refined	69,237	58,858	59,836	60,944	55,807

OUTSIDE UNITED STATES

Production:	Nov. 1952	Dec. 1952	Jan. 1953	Feb. 1953	Mar. 1953
Crude primary	109,252	123,794	121,162	118,589	120,006
Crude secondary	1,145	1,769	2,199	1,240	583
Refined copper	87,209	100,374	93,667	88,539	104,926
Deliveries, refined	71,960	84,216	81,427	65,195	71,420
Stocks at end, refined	131,575	130,103	120,629	122,223	133,267

Note: Deliveries to U. S. consumers includes copper shipped from Government stocks; also includes imports of foreign copper for account of other than members of Copper Institute. U. S. refined stocks, includes tonnages delivered to U. S. consumers at foreign ports.

Zinc Stocks Increase

A summary of the February and March statistics of the American Zinc Institute follows, figures in tons:

	Feb.	March
Stock at beginning	88,475	93,664
Production	76,899	83,485
Production, daily rate	2,746	2,693
Shipments:		
Domestic	67,729	72,388
Export-Drawback	1,997	1,315
Gov't account	1,984	3,582
Totals	71,710	77,285
Stock at end	93,664	99,864
Unfilled orders	37,172	54,524

Stocks at the end of February and March, by grades, in tons:

	Feb.	March
Special High Grade	23,060	22,214
Regular High Grade	18,872	19,375
Intermediate	2,273	1,547
Prime Western, etc.	49,459	56,728
Totals	93,664	99,864

The figures include all primary and secondary production of standard grades in the United States.

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipments f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

April 30, 1953

Aluminum ingot, 99 plus percent, lb.	20½c.
Antimony, spot, lb., 5 tons and up but less than carload, in cases	37.97c.
Bismuth, ton lots, lb	$2.25
Cadmium, commercial sticks, delivered, lb	$2.00
Calcium, lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.18
Cobalt, 97 to 99 percent, per lb.	$2.40
Germanium, lb.	$340.00
Indium, troy oz.	$2.25
Lithium, lb., 98 percent	$11.00 @ $14.00
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	60c.
Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas	27c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots) troy oz.	$90.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$195 @ $197
Selenium, 99.5 percent, lb.	$4.25 @ $4.75
Silicon, minimum 97 percent, carloads, lb.	20c.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50
Titanium, 99.3 plus, lb.	$5.00

(a) Includes U. S. duty.

METALLIC ORES

Beryllium Ore, imported, 10% BeO, per unit	$46.00 @ $48.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
44% Cr_2O_3 no ratio	$27.00 @ $32.00
48% Cr_2O_3 3 to 1 ratio	$44.00 @ $56.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$10.10
Mesabi bessemer	$9.85
Mesabi, non-bessemer	$9.70
Lead (Galena), 80 percent, Joplin, Mo., ton	$144.90
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties, $1.18 @ $1.21 c.i.f. U.S. ports, duty extra. Long-term contract nominal at 90c. to 93c., c.i.f. duty extra.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	60c.
Tantalite, 60% concentrate, per lb.	$2.50 @ $3.00
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, c.i.f. U.S. ports	$40.00 @ $42.00
Domestic, scheelite, 60 percent f.o.b. mill	$63.00 @ 65.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	31c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$65.00

(a) F.o.b. port of shipment.

METALLIC COMPOUNDS

Arsenous Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	5½c.
Cobalt Oxide, 72½% to 73½%, ceramic grade, per lb.	$1.82 @ $1.84½
Copper Sulphate, 100 lb.	$10.35
Germanium Oxide, lb.	$142.00

ALLOYS

Ferrochrome, 65 to 69 percent, per lb. of Cr contained	24¾c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$225
Ferromolybdenum, 55 to 65 percent Mo. lb. of Mo. contained	$1.32
Ferrosilicon, 50 percent, per lb. of contained Si	12.4c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$4.35
Ferrovanadium, per lb. of V delivered	$3.00 @ $3.25
Silicomanganese, Max. 1½ percent carbon, per lb. contracts	11.4c.
Spiegeleisen, per long ton, 19 @ 21 percent grade	$85.00

NON-METALLIC MINERALS

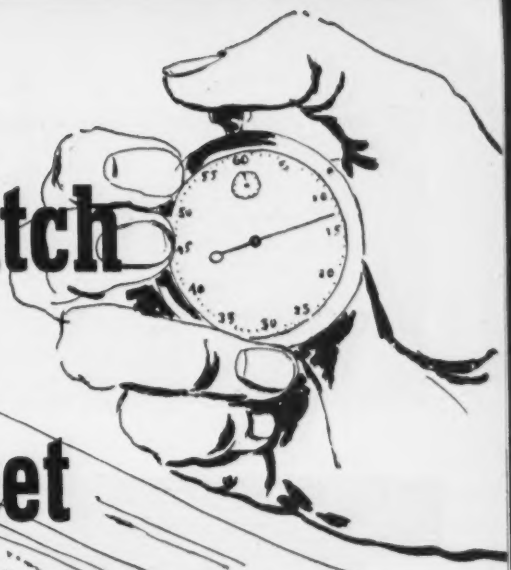
Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds) ton:	
Crude No. 1	$960 @ $1,500
Crude No. 2	$595 @ $900
Spinning fibers	$321 @ $514
Shingle fibers	$150 @ $200
Paper stock	$109 @ $137
Waste	$77
Shorts	$35 @ $70
Asbestos, Vermont, f.o.b. Hyde Park:	
Spinning fibers	$279.50 @ $302.00
Shingle stock	$135.00 @ $162.00
Paper stock	$81.50 @ $115.00
Waste, stucco or plaster	$71.40
Refuse or Shorts	$34.00 @ $63.00
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$13.00 @ $14.00
Missouri, 94 percent $BaSO_4$, per short ton	$12.00
Bauxite, long ton, f.o.b. point of shipment:	
Domestic, crude, 50 to 52 percent (not dried)	(a) $5.00 @ $5.50
Domestic, chemical, 55 to 58 percent	(a) $8.50 @ $9.50
Domestic, abrasive, 80 to 84 percent	(a) $18.00 @ $18.50
China Clay, f.o.b. mines, ton:	
Georgia, filler and ceramic grades	$8.50 @ $9.50
North Carolina ceramic grade	$20.25 @ $22.25
Feldspar, bulk ton:	
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50 @ $22.25
Glass feldspar, white, 20 mesh	$11.75 @ $12.50
Fluorspar, f.o.b. mines, bulk, 70% effective ton	$42.50
60% effective CaF_2	$38.00
Acid 97% concentrate, bulk, ton	$60.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00 @ $14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$39.56
Mica—Domestic, f.o.b. mines. Punch 12 to 22c. per lb. according to size and quality. Sheet clear, 1½ x 2 inch, 80 to 85c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.50 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet, ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton Scrap $32 and up.	
Ocher, Georgia, ton, in sacks	$26.25
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	Not quoted
Sulphur, Texas, mines, long ton	$25.50 @ $27.50
Talc, f.o.b. works, ton:	
New York, purified	$18.50 @ $20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$30.00

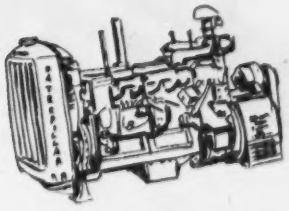
(a) Nominal.

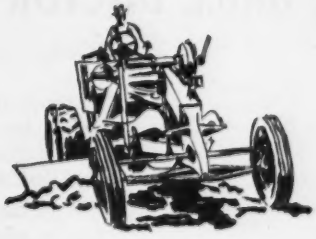
IRON AND STEEL

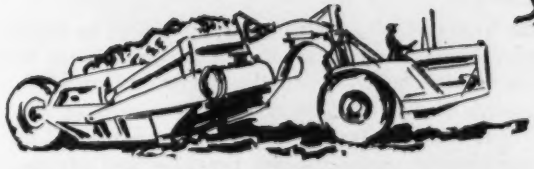
Pig iron, gross ton, basic, Valley furnaces	$54.50
Steel, f.o.b., Pittsburgh billets, net ton	$59.00
Structural shapes, 100 lb.	$3.85

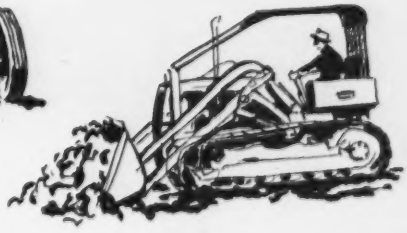
Use your stop watch and your cost sheet on your job with CAT* equipment











THERE'S one way to find out whether you're making all the profit you're entitled to. Get out your stop watch and cost sheets. Tally your cycle times and production figures. Check your down time and the resale value of your machines. These figures will convince you of Caterpillar superiority.

Your Caterpillar Dealer will give you an on-the-job demonstration. Fair enough? Call him today.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

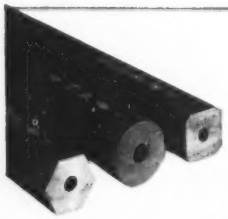
THE DRILL DOCTOR *CRUCIBLE HOLLOW DRILL ROD teamwork in specialties*

The modern, pneumatic rock drill beats out as many as 2000 violent impacts a minute. The man responsible for keeping these drills operating at top efficiency 'round-the-clock is the busy *drill doctor*.

With the high cost of labor and new equipment he knows that to provide good service his drill must be made of the finest steels obtainable. That's why he counts on Crucible.

For Crucible Hollow Drill Rods have demonstrated time and time again their ability to take it . . . to withstand the severest punishment with minimum breakage and bit loss. And Crucible mills are among the few that produce steels that meet the rigid requirements of the rock drill piston — a part that undergoes the toughest service known for steel.

To get the lowest cost per foot per hole in rock drilling, specify Crucible Hollow Drill Rods.



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53 years of Fine steelmaking

HOLLOW DRILL RODS

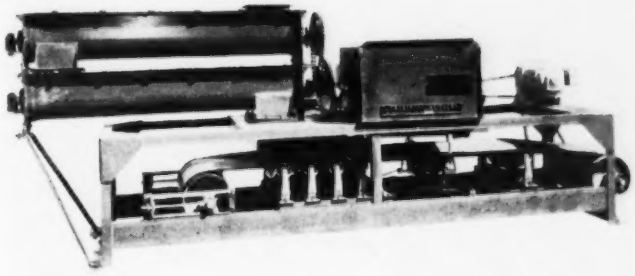
CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

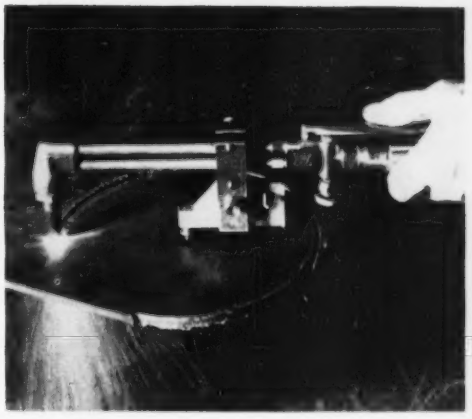
E & M J

NEW PRODUCTS DIGEST

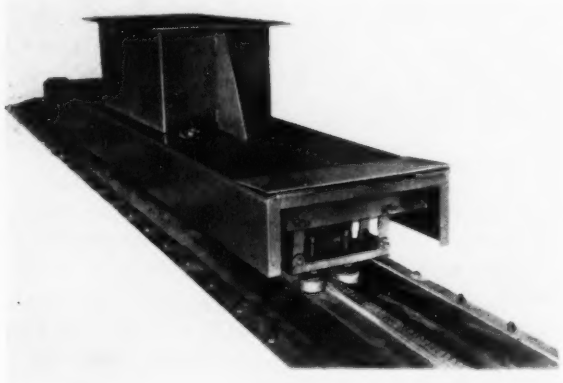
For further information on these products, circle item numbers on card—insert and mail.



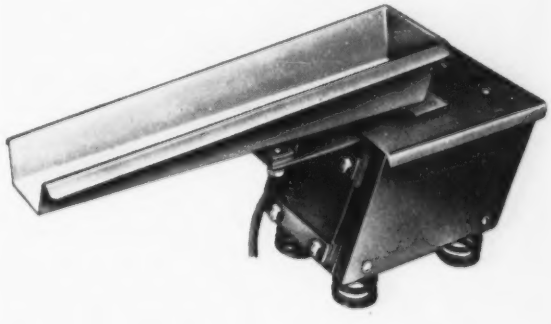
"TRANSPORTOWEIGHER" automatically and continuously transports, weighs and maintains a pre-set rate of feed of any finely divided material. Range of capacities is 10 to 24 tons per hour. The integrator records on a direct reading totalizer, the tonnage passing over the belt. Sintering Machinery Corp., Netcong, N. J. (1)



CUTTING GUIDES for gas torches are simple low-cost attachments that permit welder to do accurate cutting of a variety of shapes without special training. Made by New Era Engineering Co. (2)



BUNKER SEAL prevents dust from belt conveyor traveling tripper discharge spouts feeding bunkers. It consists of two Zipper-toothed seal belt strips and opening and closing mechanism. Stephens-Adamson Mfg. Co. (3)

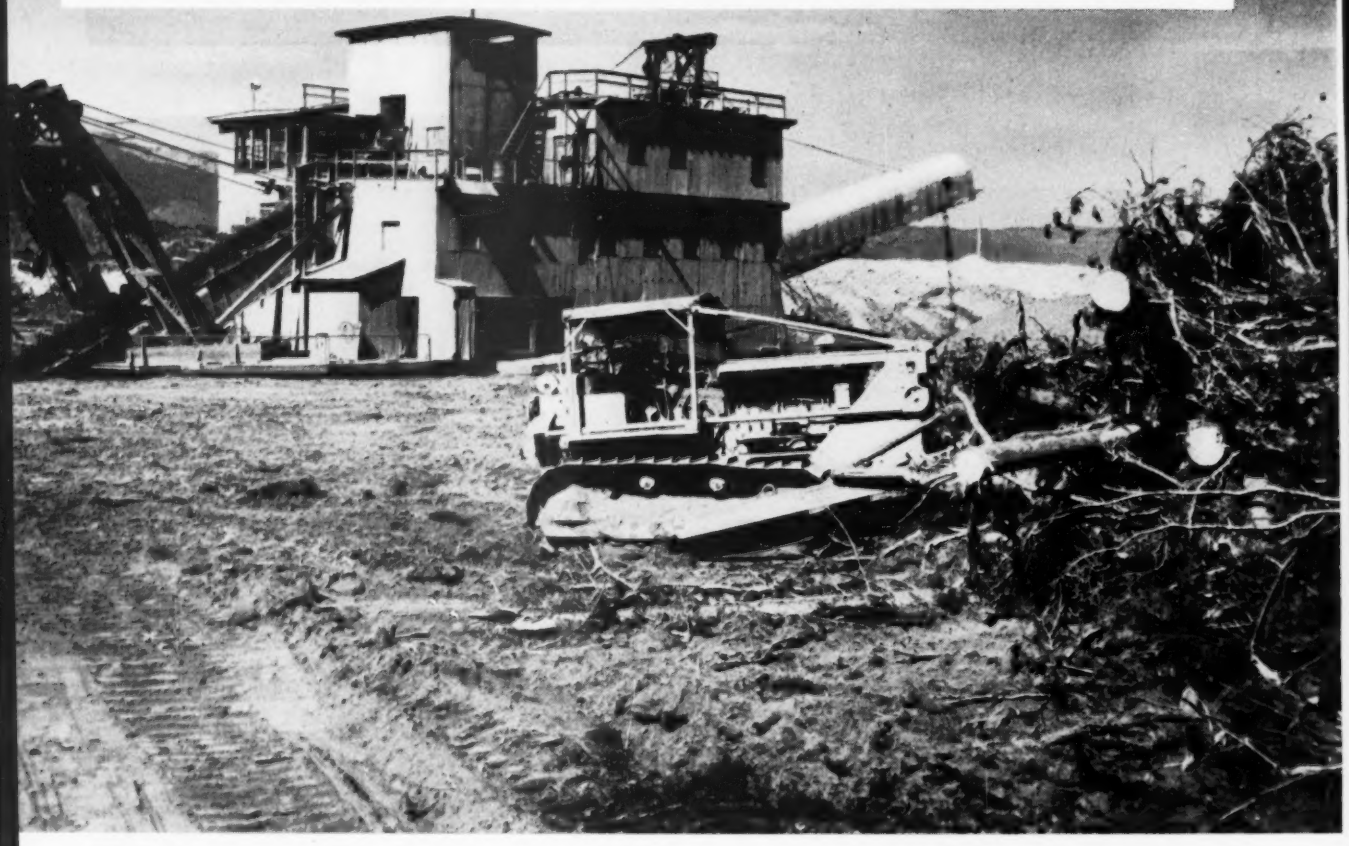


VIBRATORY FEEDER uses electromagnetic vibration to eliminate gears, bearings, belts, idlers. Capacity of Model F-00 is 500 lb. per hour. Flow is controlled by rheostat. Syntron Co., Homer City, Pa. (4)

In 1952, E&MJ handled 24,264 requests for information on new products. We'll gladly handle many more if you find it helpful.

"Long life and low repair are what we like about our Caterpillar Bulldozer!"

Jack Fisher, Dredgemaster, Baumhoff-Marshall Co., Cascade, Idaho



SINCE 1948, this Cat* No. 8A Bulldozer has done heavy duty for the Baumhoff-Marshall Co. on its monazite operation near Cascade. It clears for the dredge, levels tailings and tows trucks out of swamps, working efficiently even in muddy going. "It has done a very good job and we are well satisfied," Jack Fisher says. "Long life and low repairs are what we like about it."

On thousands of other mining operations all over the world, men who also keep a keen eye on costs echo that report on Caterpillar Bulldozers. They know from on-the-job figures that these rugged yellow machines outwork and outsave ordinary units. There are many reasons. Precision manufacture and balanced engineering build extra stamina and extra working years into them. Tractor horsepower and blade capacity are matched for smooth performance. The scientifically curved blade keeps material rolling ahead fast. Blade and end bits are made of tough steel for long, hard wear. Precision controls and good visibility enable the operator to turn out big, steady production. And your Caterpillar Dealer backs every machine with genuine parts and service, *when* and *where* you want it.

Take a tip from thousands of proving grounds of experience. Dollar for dollar, there's no better investment than Caterpillar Bulldozers. Ask your dealer for full information and a demonstration.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

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**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

Equipment Shorts

DIAPHRAGM VALVES. The Crane Co., Chicago, Ill., has announced the addition of several new body, diaphragm, and lining materials to its line of packless diaphragm valves. Valves can now be had with cast iron, brass, aluminum, or 18-8 stainless steel bodies and disc holders. Feature of the Crane diaphragm valves is the separate diaphragm and disc construction. (21)

SCINTILLATION UNIT. Willys-Overland Motors, Inc., is now building a Scintillation Unit into its station wagon for uranium exploration. It uses a boom for lowering a probe into drill hole or over cliff edges—1,000 ft., if necessary. (22)

RECTIFIERS. Portable and drip-proof rectifiers trade-named Celab—are available for dc power underground from Clark Electronic Corp., Palm Springs, California. (23)

LENS CLEANING CLOTH. Just wipe the surface of your spectacles or protective goggles with No-Mist cloth to get the object both clean and fog-proofed in one quick, easy operation. No liquids, no tissues. Carol Chemical Products Corp., Brooklyn, N. Y. (24)

LUBRICANT. A grease consistency mixture for extreme bearing pressure lubrication at temperatures ranging from —40° F. to approximately 400° F. is available from Alpha Corp., Greenwich, Conn. They call is Molykote, Type U. (25)

CONVEYOR BELT. A virtually rip-proof conveyor belt is now on the market. The carcass has multiple strands of high tensile steel wire imbedded at three-foot intervals. Even if the conveyor material punctures the belt, the tearing is limited to a maximum of 3 ft. lengthwise. New York Belting & Packing Co., Passaic, N. J., is the manufacturer. (26)

MOLTEN METAL METER. Minneapolis-Honeywell Regulator Co. has come up with a meter for insuring the flow of molten metals such as sodium, lead-bismuth, and sodium-potassium alloys utilizing a General Electric Magnetic Flow Meter and the Brown ElectroniK Recorder. (27)

WEIGHING SCALE. Keep your scales accurate without maintenance for years. That's what Applied Engineering Co., Orangeburg, S. C., offers you with the Cunningham Scale Seal which keeps out foreign matter and atmospheric contaminants, the chief causes of scale malfunctioning. (28)

DRIVE SHAFT BEARING. A drive shaft bearing, sealed to keep out road dirt and to retain the lubricant, has a heavy malleable iron casting body with a steel adjusting bolt and lubricator. Marion Metal Products Co., Marion, Ohio. (29)

STAINLESS STEEL COATING. A coating under the trade name Steelast, has developed from research done on stainless steel coating. The formula for these coatings is basically the same, using a vinyl plastic vehicle. The primary difference is that a change of pigment makes possible the manufacture of all colors including ivory, gray, green, black, and white. (30)

WHITEPRINTER. For fast service in producing whiteprints and blueprints, check into the new Speedmaster Model "S" ammonia-type Whiteprinter, developed by Peck & Harvey, Chicago, Ill. The unit takes 220 vac. drawing 22 a. It occupies 11 sq. ft. of floor space and costs $1565.00, f.o.b., Chicago. (31)

SOLDERING. To save time, solder, and labor on soldering jobs in your shop, try Eutec-TinWeld. This is a low cost, one step, paint-on solder-paste-flux combination. Just paint on TinWeld along seam and then apply the piece to be soldered. Even a pocket lighter produces enough heat to get a good solder. Eutectic Welding Alloys Corp., Flushing, N. Y., charges $5.60 for a 2-lb. can. Circle No. 32 on card below for more information. (32)

MOTOR CLEANER. The Shaler Co., Waupun, Wis., is marketing a fluid for cleaning electric motors and generators. You can put the motor in the cleaner completely submerged, plug in motor and allow to run. The cleaning will be done in 3 to 5 minutes. The cleaner may be sprayed into the intake side of motors while in operation, but the company recommends full immersion. (33)

TRANSFORMER. Westinghouse is talking about their new sealed, dry-type transformer which fails safely—that is, when it is overloaded to the point of failure, it simply drops its load. No fire—no explosion. Only a small amount of volatile material is used and the unit operates in pressure-tight cases under a small pressure of dry nitrogen. Westinghouse Electric Corp., Pittsburgh, Pa. (34)

DUST CONTROL. Transvar 266 is a product which keeps down dust on concrete floors by binding tiny particles together that are actually a part of the concrete surface. It is a thin liquid that may be applied by brush or mop and will not alter appearance of the surface. No surface film is formed. United Laboratories, Inc., Cleveland, Ohio. (35)

GRINDING WHEELS. Norton Co., Worcester, Mass., has announced a new vitrified bond for their grinding wheels. Named "G-Bond" field tests have shown excellent performance. (36)

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

Not good after July 1, 1953, if mailed in the U. S. or Canada.

Engineering and Mining Journal—May, 1953

NOT GOOD AFTER JULY 1, 1953—if mailed in U. S. or Canada.

Please send me the catalogs or further information about the items from New Products Digest whose numbers are circled.

1	8	24	31	38	45	52	59	66	73	80
2	9	25	32	39	46	53	60	67	74	81
3	10	26	33	40	47	54	61	68	75	82
4	11	27	34	41	48	55	62	69	76	83
5	21	28	35	42	49	56	63	70	77	84
6	22	29	36	43	50	57	64	71	78	85
7	23	30	37	44	51	58	65	72	79	86

My Name ..... Position .....

Company .....

Address .....

For Your Files

STEAM TUBE DRYER. This 18-page catalog gives you all the information you need for selection of Steam Tube Dryers for treating such materials as mica, fluorspar, flotation concentrates, and many nonmetallics. Bulletin 53 is available from the General American Transportation Corp., Louisville, Ky. (41)

SPROCKET WHEELS. The eight-page bulletin No. 2467 lists over 200 sizes of cast tooth sprocket wheels available from stock and tells how to select sprocket wheels accurately fitted to the chain. Link Belt Co., Chicago, Ill. (42)

EXPLOSION-PROOF MOTORS. Bulletin 800 may be obtained from the Louis Allis Co., Milwaukee, Wis. Fully illustrated, it gives you the details on the special features built in to the company's explosion-proof motors and illustrates typical uses for these units. (43)

PURIFICATION. "Purification of Metal Salt Solutions with Hydrogen Peroxide" is the title of bulletin No. 26 issued by the Buffalo Electro-Chemical Co., Buffalo, New York. It gives complete directions for isolating metal salts from process solutions. Among others it discusses the purification of electrolytic nickel plating solutions. (44)

LIFT TRUCKS. Hyster Co., Portland, Ore., wants you to know about their two new lift trucks. They are 8,000-lb. and 6,000-lb. capacity models. Both are gasoline-engine powered and mounted on pneumatic tires. (45)

SLUSHER BLOCK. Sauerman Bros., Inc., Chicago, Ill., have enlarged their line of Durolite tempered steel sheave-blocks with a block designed essentially for slushing, mucking and wrecking. Sheaves and frame are of differential heat-treated alloy steel. Swivel fittings are quick-opening and free moving. A bead cast in the frame protects rim of sheave, prevents fouling of cable. New features are (1) wider, flatter sheave groove for use of larger cable than standard block of same diameter; (2) extra wide throat opening to pass knotted cable; (3) lighter weight for easier handling. (46)

AN ELECTRONIC STETHOSCOPE. Known as the Elec-Detec, the electronic stethoscope saves time, work and trouble for maintenance men, by locating friction noises in bearings, pistons, gears, ratchets, clutches, and other parts. The instrument uses a metal probe which serves as a microphone to locate tell-tale noise. Anco Instrument Division, Chicago, Ill. (47)

TUBULAR FRAME CONVEYORS. An eight-page bulletin, No. SF-1, gives you the details on the modern tubular truss for building strong rigid conveyor systems. E. F. Marsh Engineering Co., St. Louis, Mo. (48)

SELF-PRIMING PUMPS. Details and specifications of all models from the 2-in.-7,000 gph size to the 4-in.-40,000 gph portable, self-priming centrifugal pumps, are available in bulletin 52 published by Rice Pump and Machine Co., Grafton, Wis. All models feature lightweight four-cycle air-cooled gasoline engine power. (49)

HOOK-ON INSTRUMENTS. An eight-page booklet describing General Electric's complete line of hook-on instruments including the volt-ammeter, watt-meter, and power factor meter is now available. Circle No. 50 on the card below to get your copy. (50)

BOGIES. Mack Manufacturing Corp., New York, N. Y. has put together four pages of reasons why you should use their balanced bogies on your six wheel trucks. (51)

BUCKET ELEVATORS. 70-page catalog 850, has a lot of good information for engineers interested in installing bucket elevators. It contains drawings, installation photographs, and lots of tables with dimensions, specifications and other engineering data. Jeffrey Manufacturing Co., Columbus, Ohio. (52)

WELDING. Catalog 150 contains every type of welding equipment necessary for all oxy-acetylene welding and cutting operations. The text and more than 150 illustrations provide a comprehensive guide for the welder. Modern Engineering Co. (53)

GAS ENGINES. Design, construction and operating features of the FSE-9 and FSE-13 spark-fired gas engines made by Nordberg Mfg. Co., Milwaukee, Wis., are described in this four-page bulletin, No. 221. (54)

CRANES AND SHOVELS. There can be no doubt that "Power Cranes and Shovels—Use and Application" belongs on the shelf of every man who is at all concerned with this type of equipment. The 32-page booklet, a compilation of eight articles by E. O. Martinson, Koehring Co.'s vice president in charge of engineering, contains a detailed discussion of the basic principles of power shovel and crane operation. Aided by numerous photographs, drawings, graphs and tables, the capabilities of various excavator and crane attachments are outlined along with prescribed requirements for most efficient operation of these machines. Koehring Co., Milwaukee 16, Wis. (55)

PUMP. The "Vacseal" pump is designed for handling abrasive pulps and corrosive solutions. Bulletin PB-52 from Galigher Co., Salt Lake City, Utah, shows how it operates on the vacuum seal principle and discusses its applications and advantages. (56)

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ATTRACTIVE PLANT is the new and expanded quarters of Henry Wild Surveying Instruments Supply Co. of America, Inc., Port Washington, N. Y. Executive offices, sales department and repair facilities are all housed here.

Memos from the Manufacturers

CONGRATULATIONS

To Westinghouse Electric Corp. on the novel way of presenting their report on income and how it was distributed. They used a checkbook format with checks made out to "Westinghouse Employees," "Tax Collectors," etc., for wages, taxes, etc.

To Capt. A. B. Zahn, director and secretary of F. L. Smidth & Co., on completing 50 years of service with the company.

NEW PLANTS

Lindberg Engineering Co., Chicago, opened its West Coast plant in Downey, Calif., on March 25.

Beckman Instruments, Inc. indulged in ground breaking ceremonies for a $2-million plant in February.

Gould National Battery Inc., will soon start production from its 21st plant in U. S. and Canada, a $3-million layout in Kankakee, Ill.

Simplex Wire & Cable Co., have started construction on a branch factory at Newington, N. H.

Hyster Co., will occupy a new plant at Nijmegen, Holland, on or about June 1.

Farmers Engineering & Manufacturing Co. are occupying a new plant at Irwin, Pa.

U. S. Steel Corp. is taking to the hills of Allegheny County near Pittsburgh, to establish a research center.

TAKING OVER

Baker-Raulang Co., Cleveland, has purchased the Lull Mfg. Corp., Minneapolis, and will operate the heavy-duty lift truck maker as a wholly owned subsidiary.

Colorado Fuel & Iron Corp. has completed the acquisition of the plants, inventories and business of John A. Roebling's Sons Co.

Western Machinery Co., San Francisco, has acquired Smith Booth Usher Co., Los Angeles.

BY ANY OTHER NAME

By now everyone must know that U. S. Steel Co. has been merged into U. S. Steel Corp. and all business henceforth will be conducted in the name of the Corp.

Thor Power Tool Co., as of March 17, is what used to be the Independent Pneumatic Tool Co.

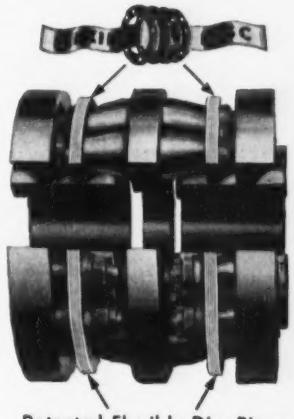
MISCELLANEOUS

One of the nicest tributes we've seen for a retiring employee is the splendid folder that Koppers Co., Pittsburgh, put together for Joseph Becker, vice president and general manager, Engineering Aid Construction Division, upon his retirement after nearly 50 years of service.

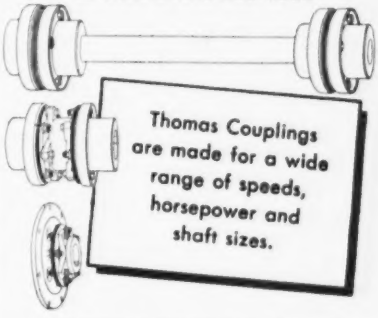
Eighteen railroad carloads of rock crushing and screening equipment bound for the British colony of Aden was sold by Pioneer Engineering Works, Inc. to Bechtel International Corp. for producing crushed and graded rock for concrete work in construction of the new Aden Refinery for Anglo-Iranian Oil Co.

Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs

DISTINCTIVE ADVANTAGES	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

NO MAINTENANCE PROBLEMS

ALL PARTS ARE SOLIDLY BOLTED TOGETHER

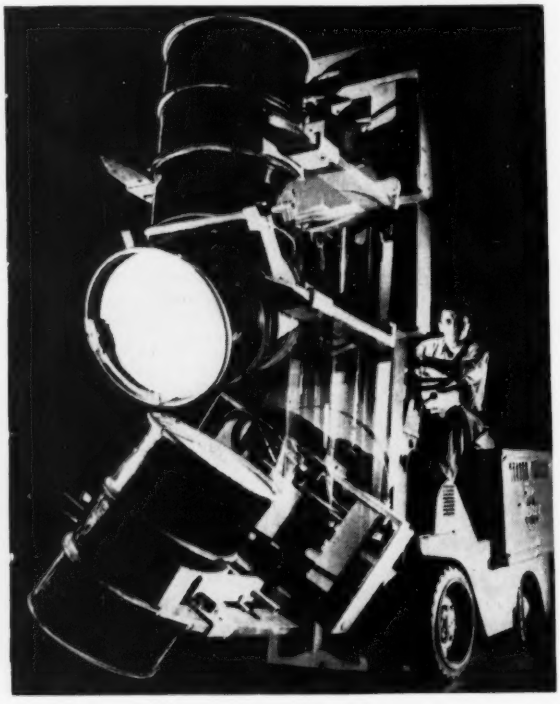
Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

Use the postage-free reply card opposite page 110 to obtain more information about any of the products illustrated on this page.

TRAILER with payload capacity of 27 tons weighs less than 8,000 lb. Built with alloy steel for transporting heavy equipment, Model R4TL has a 13 x 8-ft. platform. Martin Machine Co., Kewanee, Ill. (5)

FRONT END LOADERS, Scoopmobile models LD5 and LD10, with capacities from ¾ to 1 cu. yd., and 1⅝ to 2 cu. yd., feature four-wheel planetary drive and power steering. Mixermobile Manufacturers, Portland, Ore. (6)



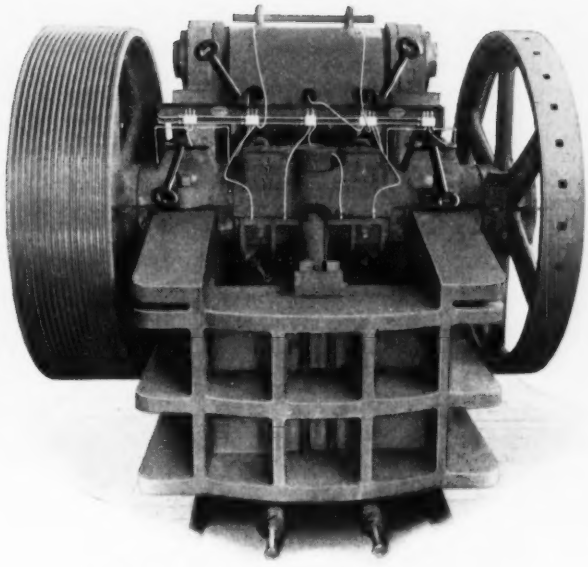
OCTOPUS, a 4000-lb. capacity fork lift with special carriage and attachments to handle a dozen different types of loads according to Baker-Raulang Co. Versatile unit is battery-powered. (7)

45-TON CRAWLER CRANE has two-piece, pin connected boom with 10 and 20-ft. center sections to lengthen it to 100 ft. The diesel-powered Lorain 820-KS is made by Thew Shovel Co., Lorain, Ohio. (8)

SHOVEL-CRANE is truck mounted. Rated at 6-tons capacity, the ⅜-yd. heavy-duty Model T-35 is the product of Schield Banatam Co., which claims that it is the lowest priced machine of its size. (9)

Dust-proof lubrication of Traylor jaw crusher insured by Farval

FARVAL—*Studies in Centralized Lubrication* No. 141



KEYS TO ADEQUATE LUBRICATION — Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine will be properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.

Photo of Farvalized jaw crusher by courtesy of Traylor Engineering Company.

YOU can't fool a rock crusher with grease cups and wick feeds. Sooner or later, dirt clogs these devices and gets into the bearings. Abrasive dust cuts. Shutdowns occur. Production stops.

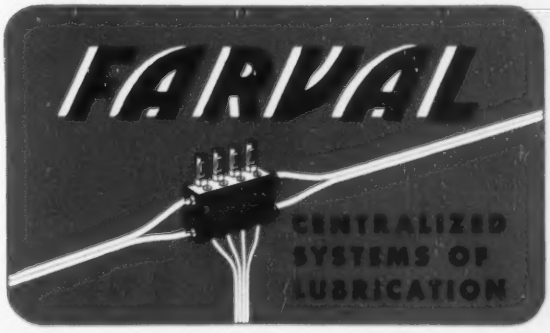
The builder of this 48″ x 60″ jaw crusher didn't take chances with bearing troubles. He chose a foolproof Farval system. Centralized lubrication keeps bearings at top operating efficiency and sealed to repel invasion of dirt and dust.

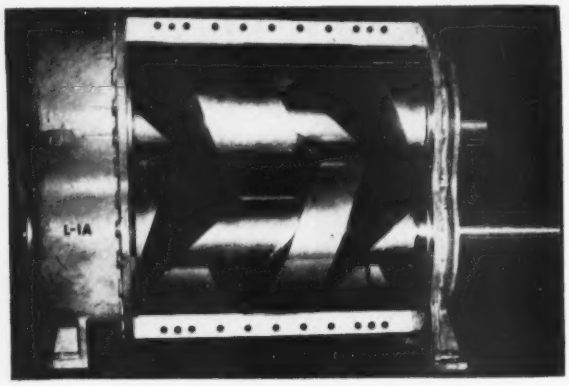
Farval delivers oil or grease under pressure to a group of bearings from one central station, in exact quantities, as often as desired. The Farval valve has only two moving parts—is simple and sure. No springs, ball checks or pin-hole ports to cause trouble. Farval lubricates while the equipment is working—keeps bearings cool regardless of the kind and quantity of material being crushed. And Farval completely eliminates the need for a hand oiler to clamber over slippery surfaces. Lubrication is safe, sure, cheap—saves labor, production time, bearing expense and lubricants.

With industry moving at high speed, more and more builders and users of machinery and industrial equipment of all kinds look to Farval for continuous bearing protection—low-cost positive protection that has been a Farval trade-mark for over 26 years.

There's a specific Farval system suitable for almost any type and size machine. For information and help, consult the Farval engineer who's near you to serve you. Or write for Bulletin 26. You'll be amazed at the savings in labor, lubricant, and increased bearing life Farval can bring. The Farval Corporation, 3281 E. 80th St., Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.





New Compressor Needs Little Servicing

Instead of conventional rotors, the "Spiraxial" compressor uses two intermeshing screw-rotors which rotate in opposite directions. These screws are operated by gears synchronized to prevent contact, allowing close but definite clearances. The flow of air or gas is axial, with most of the compression taking place at the back of the casing. This allows a large inlet opening, preventing strangulation of inlet air and increasing volumetric efficiency.

The compressor, designed for pressures of about 20 psi, has a capacity of 1,115 cfm at 1,750 rpm. Advantages claimed by Roots-Connerville Blower, the manufacturer, are peak efficiencies at discharge pressure required, no internal lubrication, minimum servicing, low noise level, light weight. **(10)**

Air-Leg Drill Offers Operating Ease

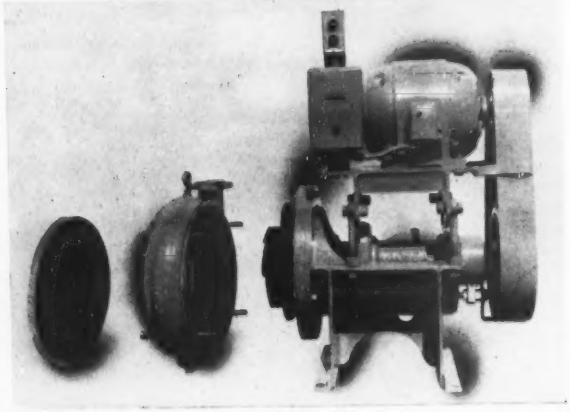
An air-leg rock-drill combination that can be used as drifter, stoper or Jackhamer, is a completely integrated unit available from Ingersoll-Rand Co. Known as the JR-38 Jackdrill, its most radical innovation is a built-in air coupling between the drill and feed leg, doing away with the third hose. For the operator's convenience, the control valve for feed leg pressure is built into the backhead of the drill. The feed leg pressure can be shut off with the throttle valve controlling drill operation. This eliminates pressure adjustment every time the drill is moved to a new hole. The backhead is designed so that flushing water is turned on when the throttle is opened. Total weight of unit is only 88 lb. using the 3-ft. feed. **(11)**

Tandem Slusher Hoist Saves Space

The Vulcan-Denver slusher hoist is Vulcan Iron Works Co.'s answer to demand for a heavy duty slusher with high capacity, mobility, ease of assembly and economy of space. The tandem style puts both drums on the drift's center line without excavation of walls.

The 150-hp. high-slip motor permits a rope pull of 20,000 lb. on the first layer, and a rope speed of 280 fpm. Capacity is in excess of 1000 tph using a 72-in. scraper.

In each planetary case are three forged steel, straddle-mounted planetary gears carrying internal roller bearings. Ball bearing supported planetary gear housings are completely sealed. Clutches are semi-flexible, servo-acting, semi-post type, with clutch blocks mounted on planetary gear housing. Main bearings are SKF spherical, self-aligning type. **(12)**



"Vacseal" Pumps Handle Acids and Solids

"Vacseal" solids and acid-handling pumps in sizes from 2 to 8 in. and capacities to 3,000 gpm., operate on the patented vacuum seal principle. The impeller is a disc with pumping vanes on one side and smaller auxiliary vanes of greater diameter on the other, next to the gland. These auxiliary vanes produce a vacuum on the shaft seal preventing solids from cutting shaft or packing. Pumps are virtually glandless and require no sealing water.

Rubber-lined pumps can be made acid-proof by changing the gland bushing and installing a shaft sleeve. Heads up to 100 ft. are possible. With all-metal pumps, heads up to 150 ft. are possible. Both types will handle suction lifts of from 10 to 12 ft. Both horizontal and vertical pumps are fitted with heavy shafts and bearings and rugged pumping elements for heavy continuous duty. Parts are easily accessible. Galigher Co., Salt Lake City. **(13)**

KENNEDY

Machinery and Equipment

for cement, lime and mining plants

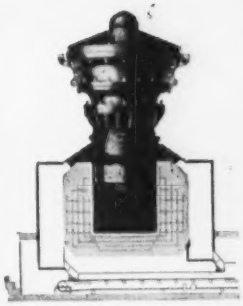
...IN USE THE WORLD OVER

Good machinery just doesn't happen! It is the result of sound design, engineering and manufacture . . . the kind of facilities which distinguish *all* KVS products . . . world-famous for their mechanical excellence and economy of operation.

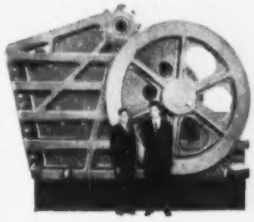
In their Danville, Pa., plant, occupying over 20 acres of space, KVS manufactures everything from a crusher to a complete cement, lime, or mining plant. The importance of world-wide experience in designing and building machinery and equipment which delivers maximum output at lowest operating costs is demonstrated in every KVS installation.

Whether your requirements call for the addition or replacement of a single piece of equipment, the modernization of an existing layout or the building of a complete plant for the manufacture of cement, lime or mining operations, Kennedy engineers are at your service to assist in planning, creating and specifying the installation best suited to your needs.

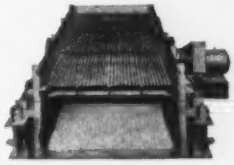
KVS engineers are available for consultation anywhere in the world. We invite your inquiries regarding our machinery and equipment . . . literature is available upon request . . . to help you determine the BEST method of solving your individual problems. Get the KVS story *before* you specify!



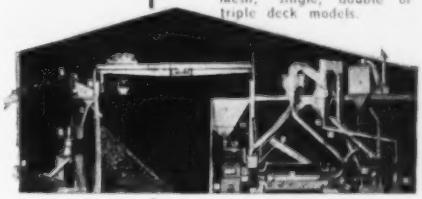
Gyratory Crusher, primary and secondary types, with double discharge outlets.

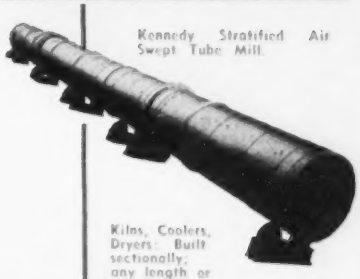


Swing Jaw Crushers: Heavy duty models, reversible jaws.



Vibrating Screens: Four-way motion; removable mesh; single, double or triple deck models.





Kennedy Stratified Air Swept Tube Mill.

Kilns, Coolers, Dryers: Built sectionally; any length or diameter.

IT COSTS LESS.. TO OWN THE BEST!

KENNEDY-VAN SAUN

MANUFACTURING & ENGINEERING CORPORATION

TWO PARK AVENUE, NEW YORK

FACTORY DANVILLE, PA.

KEEPING TAB ON PRACTICE

CAB IN FRONT, compressor in cab, are among unusual features of this 500-hp. locomotive in Chuquicamata open pit.

Electric and Diesel-Electric Locomotives at Chuqui Have Unusual Features

H. J. TYLER
Transportation Engineering
Westinghouse Electric Corporation
East Pittsburgh, Pa.

FIVE 500-HP. Westinghouse locomotives have been in service in the Chile Exploration Co.'s open-pit Chuquicamata mine since June, 1950. These small mine-haulage locomotives appear to be built backwards—the cabs are in front, instead of in the rear, as customary. This affords the operator excellent visibility through the large area of glass around the cab. Directly behind the cab is the electrical compartment. This contains the main accelerating resistors and Westinghouse unit switches for line operation, as well as control apparatus. The rear compartment contains the diesel engine-generator set.

The motor-driven air compressor is in the operator's cab. This may seem unusual, but the large slow-speed compressor used is exceptionally quiet-running. Its 150-cfm displacement gives enough air for car-dumping, air brakes, and motor control.

To permit the locomotives to move freely, it was necessary to provide three sources of power: trolley, third rail, and diesel-electric.

These locomotives operate at 10,000 ft. altitude over rock-strewn tracks, with the engine running continuously in highly-abrasive dust. Because of the altitude, it was necessary to derate the diesels from 675 hp. to 500 hp.

Locomotive operating conditions here are poor. Temporary track is laid over rough ground. It is not uncommon to see a locomotive wheel lifted free of the rail; derailments are frequent.

To minimize damage during derailments, the swivel-type trucks are held captive by slotted brackets on the underframe. This prevents breaking of traction motor electrical cable and air brake connections by holding the trucks in line when off the tracks. Also, sweeper bars in front of the trucks a few inches above the rail perform a double function; they sweep the track free of debris and provide a safe rest for the truck when derailed.

Third-rail mechanisms are mounted on wooden beams so that a collision with an obstruction on the third-rail right-of-way will shatter the beam without destroying the mechanism.

Two sets of filters are used to remove the abrasive dust completely from the engine air intake. The first dust barrier consists of 24 20-in. x 20-in. heavy-duty Air-Maze filter panels mounted behind louvers on the engine-compartment access doors. Cool air is drawn in through the filters and pushed out through the radiator at the rear of the locomotive by an engine-driven axial-flow fan. The second dust barrier consists of three Air-Maze filter panels mounted across the engine air intake. All filters require cleaning at least once a month.

The diesel engine is kept running continuously, not only to have the diesel engine warmed up and ready for instant use, but also to provide continuous-battery charging without the need of furnishing line-charging and changeover apparatus. Thermostatically-controlled air vent shutters are used to throttle air through the radiators, thus keeping water temperature up during prolonged idling.

Power Plant. The locomotive power plant consists of a Superior 40-LX-6 diesel engine direct-connected to a Westinghouse type 198-A generator.

The generator is a conventional Westinghouse diesel-electric, separately-excited type. Its continuous rating at 1100 rpm is 1300 amp. at 308 v. The shunt field of the generator is excited by a type YG-49-A exciter-auxiliary generator mounted on top of the main generator.

Engine load control is provided by the Westinghouse "Autoload" control system in conjunction with a Woodward UG-8 governor and differential series exciter. The system functions to adjust the field currents to prevent the main generator from demanding more power than can be produced.

The main generator is equipped with a series-starting winding to permit its use as a motor to crank the engine by storage-battery power.

Totally-enclosed traction motors, type 582-ERT-8, were specified by Chile Copper to duplicate earlier motors supplied. Two motors are mounted on each swivel truck. They drive the axles through single-reduction gearing.

Control. The locomotives are equipped with single-station, single-unit control, with the operator's control station on the right side of the cab. At this station are grouped the master controller, the power selector controller, independent and automatic break valves, instrument panel, foot sander switch, engine starting and stopping pushbuttons, bell ringer valve, air-horn pull cord, window-wiper controls, shutter motor-control switch and various light switches.

The source of power is selected by a small three-position controller and a large three-position power-changeover cam switch. The master controller controls the speed and direction of the locomotive on both line and diesel power.

Acceleration on line power is accomplished by 22 resistance notches. Three running speeds are provided at quarter, half, and full line voltage.

Speed is controlled during diesel-electric operation by changing the speed and field excitation of the engine-generator set. The master controller controls the speed setting of the engine governor by means of an electro-pneumatic throttle operator. The first nine notches of the master controller are used for diesel control. The ninth is a field shunt notch to in-

Locomotive Data

MAJOR DIMENSIONS	
Track gage	4' 8½"
Height over roof	11' 11"
Lockdown pantograph height	14' 0"
Maximum trolley wire height	21' 3½"
Minimum trolley wire height	14' 8"
Overall width	10' 0"
Track wheel base	7' 10"
Truck center distance	25' 0"
Length between coupler faces	44' 0"
ENGINE	
Superior 40-LX-6, 8½" by 10½"	500 gross hp. at 1100 rpm
WESTINGHOUSE ELECTRICAL EQUIPMENT	
Main generator	One Type 198-A
Exciter-auxiliary generator	One Type YG-49-A
Traction motors	Four Type 582-ERT-8
Gear ratio	16:70
Driving wheel diameter	36"
TRACTIVE FORCE AND SPEED	
Starting tractive force (at 25% adhesion)	42,500 lb.
Continuous tractive force	7,200 lb.
Speed at continuous tractive force	13.3 mph
Maximum speed	35 mph
Locomotive weight (operating condition)	180,000 lb.

crease the speed under light loads.

An "Engine Only" position is provided on the reverse handle to permit speeding up the diesel for test purposes with the locomotive at a standstill.

A button on the top of the master controller allows the main handle to move to a standby position behind the off position. This position speeds up the diesel engine with the locomotive at standstill in order to pump air.

A deadman's handle is attached to the master controller main handle so that the former must be held down to operate the latter. If the deadman's handle is released in an operating position, power is taken off the motor circuits and emergency braking is applied. For convenience, the deadman's handle is held down in the off and standby positions.

Less Water From Sand Filling at Holden

TO DECREASE THE AMOUNT of drainage water which now has to be pumped out of Howe Sound Co.'s Holden mine in Washington, when filling stopes with sands, the company has planned to install a 12-in. sand cone on the main haulage level to dewater the sand from about 40% solids to 60%, this before passing them on to the lower level stopes to be filled.

A Quick Survey of South African Practice

THE P AND M DETACHABLE bit is still the only type in general use. It is not used altogether as a single-use bit —at least a third are used twice. In consequence a saving has been made in the quantity used by the mines.

Carbide bits are still used only in shaft-sinking and in small quantities. No new bits have come into use over the past year.

No increase is recorded in drilling with carbide-tipped forged-steel jumpers on the part of the Central Mining Rand Mines group, whose figures are as follows: 58,000 in 1950; 120,000 in 1951; and 118,000 in 1952. Other groups have increased their consumption slightly.

As to mechanization, more use is being made of loaders underground but, in general, this is a period of consolidation in an effort to obtain maximum benefits from these and other forms of mechanization. The major problem is the shortage of European and African labor. Training schools have been set up but it will take time before results will be felt. African operatives have to be taught not only how machines work but also the name of parts and how they function. As most of them are completely raw, this is difficult. With no knowledge these men have to be made mechanically minded.

A further problem is that many African mine workers work only a relatively short time and go home. This is a serious handicap.

At the stope faces, there has been no new development in mechanization. Face scrapers are in general use, but nothing has been developed to take the place of African shovel-boys. Any invention to save labor here would be of major importance.

Use of the mechanical grab in shaft-sinking continues, but it would appear that all the snags have not been ironed out.

Mechanical loaders are generally giving good results in tunneling and driving in the new mines. In Orange Free State, however, the general rate of advance is not as high as it might be. The problem is the continuous intersection of water. Interruption of work by a team as a result of this results in a sharp loss of the efficiency gained through steady work over a period. A team virtually has to start from scratch and build up again.

Adoption of rubber or crawler-mounted loaders and jumbos in the gold mines has not been possible, owing to narrow reef formations extending over a large area. Unlike U.S. mines, stoping widths are narrow and mineralization does not occur in lodes.

In mechanical transport, increasing use is being made of diesel locomotives underground. Interest has been shown and orders placed for gyroscopic underground locomotives from Switzerland but none have been delivered so far. They are reputed to produce about 50-60 ton/miles from one charging of the gyro-wheel and be remarkably stable on underground tracks.

Rhokana's Practice Shows Some Changes

L. W. ALLEN, acting general manager of Rhokana Corp., at NKana, Northern Rhodesia, cites the following modifications of their mining practice:

Carbide-tipped forged steel: In all types of development this is used.

Carbide-insert detachable bits. A cruciform bit is now used in the drilling of long blast holes. See following:

Long-hole drilling with coupled rods and carbide bits: Gardner-Denver D 99 machines with extension steel are being employed to drill long blastholes above horizontal (70 ft. average length). A fifth of all b'ast holes are drilled in this way, the remaining 80% with diamond drills.

Drilling facilities: The jackhammer-airleg combination is the standard used in all development work. In raising, stopers are used under certain circumstances.

Blasting techniques: All BX blastholes are now detonated by millisecond delay detonators, resulting in much improved fragmentation.

Ground Support. Roof bolting is being widely used in support of underground excavations other than stopes. Successful experimental work has been done in temporary support of stope hanging walls while actual stoping is in progress and prior to the induced caving of the stope.

Haulage, Transport: Three 15-ton Jeffrey trolley locomotives are now in use on long hauls. On normal hauls 13-ton Jeffrey and Greenbat locos are used. Small battery locos continue to be used in cleaning haulageways. Two Ruston Hornsby 8-ton diesel locomotives are used in small-tonnage areas, and two 15-ton North British diesels are being introduced shortly for normal haulage work.

An underground conveyor is being installed for transport of rock from

new sub-vertical shaft at NKana to the Central shaft.

Ventilation: Re-equipment of all sub-development ends with new 15-in. G.E.C. fans in place of 10-in. Venturis is proceeding.

Experiments using the NX size hole for hanging cave drilling have proved very successful. In future these holes will be used for all work of this type.

Shank Breakage Less With 1-in. Tipped Steel

CHANGES IN MUFULIRA Copper Mines' drilling practice with carbide-tipped forged steel are as follows, according to A. B. MacLaren, general manager of this Northern Rhodesian company.

One-inch hexagon steel has been accepted as the standard-size steel after experience indicated that in Mufulira's hard ground shank failures in ⅞-in. steel were excessive at 35.29%, compared with 3.74% in the 1-in. steel.

The best sequence of stem lengths to prevent over-drilling of certain steels and at the same time insure an even rate of wear in the tungsten carbide was determined and found to be:

Jacklegs and raise feed—(a) 46 in., (b) 82 in., (c) 118 in.

Stopers—(a) 33 in., (b) 54 in., (c) 78 in., (d) 102 in., (e) 126 in., (f) 150 in.

Efficiencies obtained for year July, 1951-June, 1952, were:

	T.C. Steels ⅞-in. Hex.	T.C. Steels 1-in. Hex.
Footage drilled per discarded steel	295.9	481.6
Average sharpening per discarded steel	12.5	16.2
Footage drilled per sharpening	23.6	29.7
Cost per foot drilled, pence	2.54	1.92

Prior to introduction of tipped forged steels in March, 1950, the advance in stope preparation development averaged 1.2 ft. per African shift.

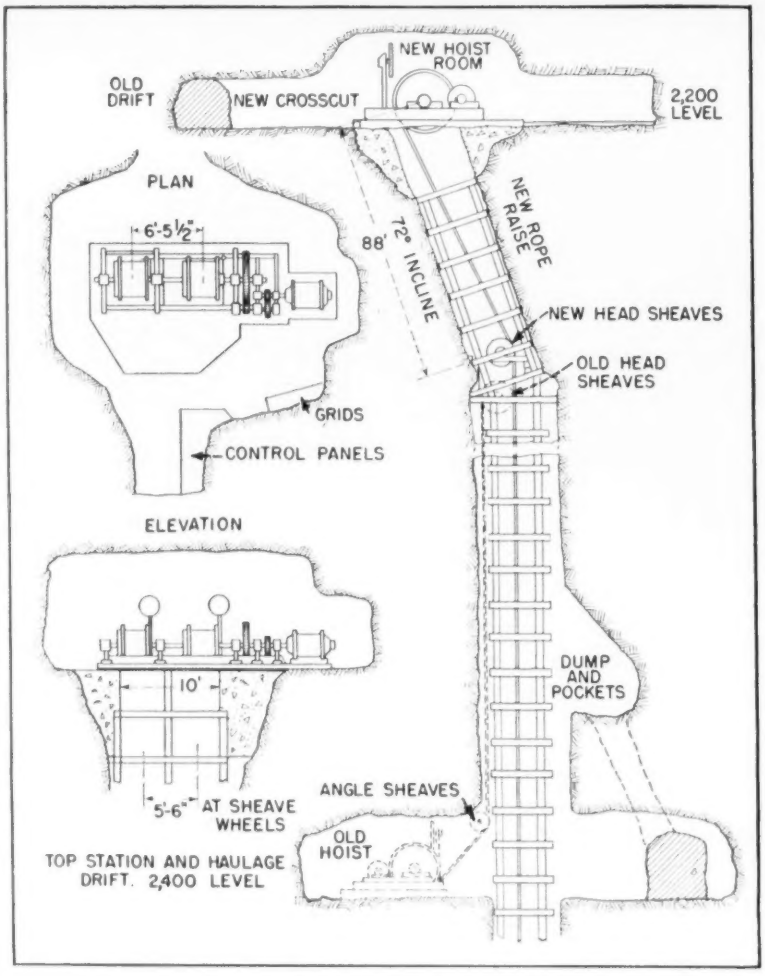
With progressive introduction of tungsten carbide the advance improved considerably and reached 2 ft. in December, 1952.

Likewise the open stoping tonnage per African shift, which prior to March, 1950, averaged 14 tons, has increased and reached an average of 33.7 tons over 6 months ended Jan. 1.

All ore is hoisted up Selkirk shaft in two skips of 11 short tons capacity from loading boxes at the 1350 ft. and 1850 ft. levels. During the first quarter, 1952, the hoisting rate was low, due to coal shortage. Once full production was resumed, hoisting improved. August output was a record, with 316,300 tons milled.

Weight-reducing materials are now used in construction of a 4-deck cage for Selkirk shaft to increase service capacity. This cage carries 272 men or 40,800 lb. of materials and has the main frame in steel with M.G.7 alloy doors, decks and sides. Tare weight with attachment is 23,788 lb.

Previously, an all-steel two-deck cage was used having a capacity of 136 men or 20,400 lb. of materials and a tare weight of 18,000 lb.



THE NEW LAYOUT, here illustrated, was made possible because of the existence of a drift on 2200 level. With this as a starting point, crosscut was driven, hoist room cut out, and a 72 deg. incline was excavated.

Installing Hoist Underground Has Advantages

ROLLIN FARMIN, superintendent, Day Mines, Inc., Wallace, Idaho, states that installation of a larger hoist became necessary in 1951 to permit deeper operation of an offset shaft at the bottom of the company's Tamarack mine. Hoisting during development of 2,400- to 3,000-ft. levels had been carried out with a small double-drum hoist at the shaft collar, employing angle sheaves instead of a rope raise. Clearance from head sheaves to skip dumps was insufficient and the sheared ground around the shaft made it undesirable to do any additional side excavation.

The new installation pictured was possible through the presence of a drift on the next higher mine level, the 2,200. The job involved excavation of a crosscut to the new shaft site from the old tunnel, of a hoist room and a 72-deg. raise leading from the end of the shaft to the hoist room, and installation of a 150-hp. double-drum Vulcan hoist. Diameter of each drum is 42 in., and width of face 36 in. Excavation work was completed and the new hoist put in operation without interrupting hoisting schedules. The new layout has several advantages over the alternative installation at collar elevation, the chief being:

1. Greatly reduced excavation without leaving weak pillars.
2. Perfect fleeting angle.
3. Shorter hoisting cables.
4. Light load on the head sheave wheels, permitting roller bearings.
5. Natural ventilation.
6. No run back of detached hoist cable when changing skips.

The new hoist foundation extends from a concrete collar in the top of the rope raise, and the old hoist room on the 2,400-ft. level was converted into a skip-cage changeover pocket. Walls of the new hoist room are reinforced by rock bolts and gunite.

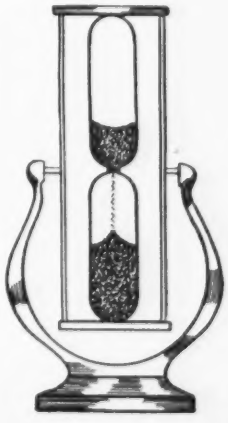
The Sands of Time

Were half of the ancient mariners' speedometer

When the Turks captured Constantinople, 500 years ago, and blocked the ancient caravan trail to the Orient, western traders had to seek another route—by water.

So, away sailed the admirals and captains, and Vasco Da Gamma found his way to India, Columbus found America, Drake rounded Cape Horn into the Pacific. Frobisher explored Hudson's Bay, Pizarro and Balboa penetrated Mexico. Never before had so many adventurers roved so far.

And how far did they rove? Well, that was a computing job for scientific equipment—a log-line with a knot tied in it every 47¼ feet (1/129th of a nautical mile), a sand-glass that emptied in 28 seconds (1/129th of an hour) and a sailor who could watch the sand-glass while he counted the knots running through his fingers as the log-line caught the pull of the ship's wake. Multiplying this count by 129 gave the number of "knots" that the ship was traveling in the hour. And this early speedometer would measure marine time and travel for another 300 years. At the drill rig, too, time and travel are important because they measure footage costs, and in reducing footage costs there's nothing so effective as Truco Diamond Bits. Their irresistible cutting power takes them through any formation swiftly, accurately, thriftily, dependably. They are used profitably in every phase of drilling. Consult your Truco Diamond Bit Catalog.



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Morton A. Reichek, McGraw-Hill Washington News Bureau

Lewis Fights Lyon's Appointment — Freeze Halts DMPA Contracting — Sliding-Scale Faces Tax Battle —

FELIX WORMSER'S appointment as Assistant Secretary of Interior breezed through the Senate, and Mr. Wormser was confirmed in his new job April 14. Additional details appear later in this text.

A rumble of protest from John L. Lewis has, however, apparently held up nomination of Tom Lyon as director of the Bureau of Mines. Lyon's name was set to go to the Senate along with Wormser's (April 7), but Lewis, who wants J. J. Forbes retained as director, wrote the White House that he was not pleased.

Marion Clawson's resignation as director of the Bureau of Land Management was demanded last month by Interior Secretary McKay. In his place would go Edward Woozley, formerly Land Commissioner for the state of Idaho. Clawson fought bitterly against his removal, claiming that he was being removed from a Civil Service job for purely political reasons.

Freeze On DMPA

The White House has ordered DMPA not to sign any more purchase contracts under its 41 mineral expansion programs. The domestic small-lot, spot-purchase arrangements on tungsten, manganese, chromite, mica, beryl, columbium-tantalum, and asbestos are not affected, however.

The freeze has been put on the long-term market guarantees until the Administration decides how to handle the mineral expansion program.

The expansion program is sure to continue past the July 1 expiration date. The Administration-supported Capehart Bill retains for two years the President's authority to encourage exploration, development, and mining of critical minerals, and provides authority for extending the termination date on long-term purchase commitments from June 30, 1962 to 1963.

A secondary reason for the DMPA freeze: the agency goes out of business next month. The basic purchasing function will probably be taken on by GSA's emergency procurement service, the government's stockpile buying agency headed by A. J. Walsh. DMPA's program planning work will probably be incorporated into ODM, which becomes a permanent agency, headed by Arthur S. Flemming.

ODM's function becomes twofold: On the planning level, it will do the ivory-tower thinking on industrial mobilization (the type of work done formerly by the now-defunct NSRB); on the operating level, it will be the top-echelon agency on such defense jobs as priorities, allocations, economic stabilization, expansion of facilities, and stockpiling.

Mining Expansion Status

This is the current status of DMPA mineral expansion programs: complete —seven metallic programs, 13 nonmetallic; 90% or more—six metallic, four nonmetallic; 80% or more—one metallic, two nonmetallic; 70% or more—one metallic, 2 nonmetallic, less than 70% complete—two metallic, three nonmetallic.

These are the comprehensive programs, including both the long-term purchase commitment and the small-lot, spot-purchase schemes. The goals are subject to change because they are based on current military, stockpile, and essential civilian requirements. This is where the new Administration policy will show how much more expansion, if any, will be stimulated by the government.

Sen. George Malone (R.,Nev.) and Rep. Wayne N. Aspinall (D.,Colo.) have introduced bills extending by two years the expiration dates on the domestic small-lot, spot-purchase programs. But the bill will probably die in committee since DMPA has not recommended passage.

DMPA says the bills are unnecessary because of the Capehart Bill provisions. In addition, agency officials argue that the bills could provide an unrealistic stimulus to many small miners. The small-lot programs now end when the tonnage goal or the expiration date is reached. Shipments to government depots have speeded up during recent months because development work on many new mines has finally been accomplished.

The agency hesitates to encourage additional interest in the small-lot program. Officials fear that goals will be met before mining development work, that is started this year, would be eventually finished.

Status of the small-lot, spot purchase program appears at right.

Lead-Zinc Tariffs

Washington's free-trade advocates are making a major issue of the lead-zinc sliding-scale tariff proposal, and feel confident they can block passage of any bill to set up the additional import tax. Four such bills have been introduced, the most important one by Rep. Richard Simpson (R.,Pa.) which has other provisions of the Reciprocal Trade Law. **(For the views of the American Metal Co., see page 138. A statement in rebuttal by Otto Henes, Salt Lake City, reached us too late for inclusion in this issue.)**

Some mining spokesmen are so gloomy about tariff prospects that they talk about accepting the Johnson bill to set up a government metals credit corporation. They assert that the Johnson proposal, which they readily criticized as costly, may be better than nothing.

Tariff proponents have been heartened, however, by the Presidential appointments of Joseph Talbott of the Tariff Commission and Felix E. Wormser as Assistant Interior Secretary for Mineral Resources, and by the lack of a strong White House position on the lead-zinc bill. Another encouraging factor: There is no one big name among the Administration's free-traders to take charge of the anti-tariff struggle.

President Eisenhower asked for a one-year renewal of the Reciprocal Trade Law, pending a "profound study to determine long-range trade policy for the Country's overall good."

The Simpson bill extends the reciprocal trade program, but has certain strings attached. One string is the sliding-scale tariff on lead and zinc. The others: a tough import quota on foreign oil, a requirement binding the President to the Tariff Commission's "peril-point" findings, and an enlarged Tariff Commission, presumably with a high-tariff Republican majority.

A compromise has been reportedly worked out between the White House and Simpson bill proponents; the

DMPA's Small-Lot Program

PROGRAM	GOAL	PURCHASED
Tungsten	3-million short-ton units or June 30, 1956	4.6%
Low-grade manganese (purchase at 4 GSA depots)	18-million long-ton units or June 30, 1956	4.2% (or Averages 20% manganese
High-grade manganese (40% minimum content acceptable)	19-million long-ton units or June 30, 1956	1%
Chromite	200,000 long-tons or June 30, 1955	12.4%
Mica	25,000 short-tons of hand-cobbed mica or equivalent or June 30, 1955	4%
Beryl	1,500 short-tons or June 30, 1955	0.6%
Columbium-tantalum	15 million lb. or Dec. 31, 1956	3.4%
Asbestos	1500 short-tons crude #1 and/or, #2, Oct. 1, 1955	3%

President to accept the last provision, the others, lead-zinc tariff included, to be knocked out. There would then be a more protectionist-minded Tariff Commission, which could be counted on to be sympathetic to appeal from domestic companies hurt by foreign competition. The President would find it politically impossible to veto all the bill's recommendations for higher duties.

The free-traders, particularly in the State Department, have loudly condemned the lead-zinc sliding-scale tariff as an "economic monstrosity." Some of them even take issue with the recent Bell report on foreign trade, which denounced the tariff but conceded that it would stabilize the domestic lead and zinc markets.

The State Department critics argue that the tariff would make the market more unstable. They also question how buyers could make forward contracts without knowledge of future tariffs.

This kind of talk is apart from their big argument that the new tariff would violate international treaties. Tariff supporters, of course, say these alleged market fluctuations would not be as severe as the dips that occur in the market under the present low tariff, killing off so many domestic mines.

The first foreign reaction has come from C. D. Howe, Canadian Minister of Trade and Commerce, who warns that his country would "protest any overt act which would bar our metals from the U.S. market."

Wormser Steps In

The new Assistant Interior Secretary for Mineral Resources, Felix E. Wormser, former St. Joe Lead vice president, and a one-time *E&MJ* staff member (1920-25), will have charge of the Department's Bureau of Mines, Geological Survey, DMEA, Oil and Gas Division, and Division of Geography.

Wormser has sold his St. Joe stock and says he has no plans to return to the company. Before his appointment was approved by the Senate Interior Committee, Wormser was badgered by Sen. Henry Jackson (D.,Wash.) for his advocacy of the lead-zinc sliding-scale tariff.

Under Jackson's pointed questioning, Wormser said he had no part in drafting recently-introduced tariff bills. He guessed that imposition of the new tariff would boost domestic lead and zinc prices "only modestly higher than world price," maybe two or three cents a pound. He told Jackson that he was "in no position to state the effect of higher domestic prices on St. Joseph profits."

Jackson said Wormser's advocacy of a tariff and opposition to a premium price plan or subsidies was inconsistent. Wormser disagreed. He said a tariff is a device to raise revenue and protect domestic industry. He called subsidies discriminatory because of different treatment accorded various producers in one industry.

LABOR THIS MONTH

Joseph M. Gambatese, McGraw-Hill Washington News Bureau

Mine-Mill asks 15¢ hourly wage increase: Bargaining demands of Mine, Mill and Smelter Workers on the nonferrous metal mining industry were announced in Denver following a national conference of Mine-Mill leaders. They include:

Fifteen-cent hourly wage increase.

National occupational disease fund financed by employer tax of one cent for every man-hour worked. Fund, administered jointly by union and industry, would provide medical, hospital and rehabilitation care for victims of occupational diseases in the industry. The union called particular attention to silicosis and lung cancer.

Sickness and accident benefits of $50 a week for any disability, whether or not work-connected.

Overtime premium for all work on Saturdays and Sundays.

Higher shift differentials.

$125 monthly pension.

Bargaining outlook: Major mining labor contracts have a July 1 deadline. Same as basic steel. Steel and mining will provide the first big bargaining test of 1953. (Showdown in coal mines and railroads won't come until October.) Our guess is that both steel and nonferrous mining can avoid a strike with a modest increase. Not much. Around a nickel. The orgy of whopping increases near the 20¢ level is over. Note how even Mine-Mill has come down 40% in its demand. Last year the union wanted a raise of 25¢ an hour.

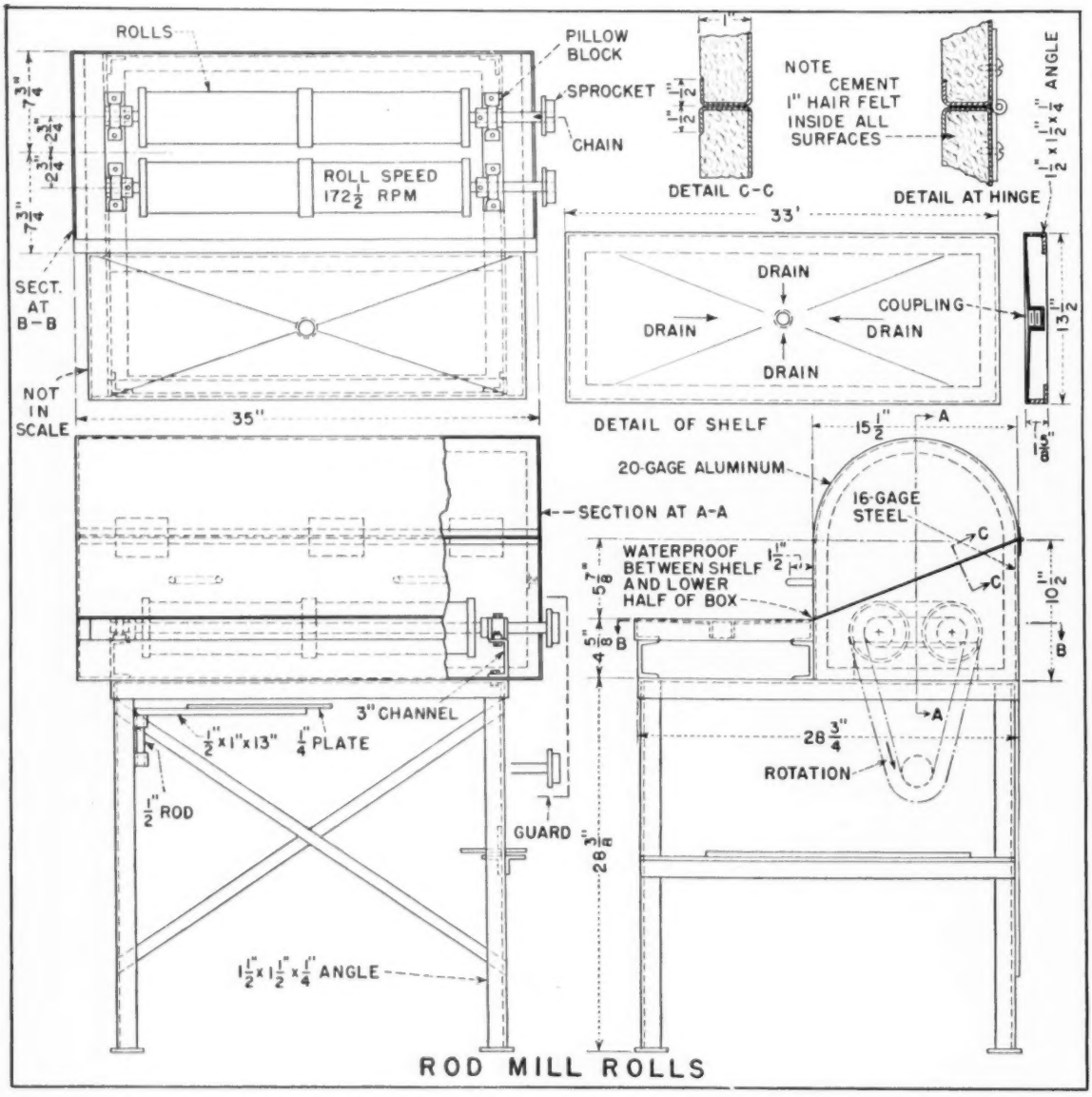
Long-range bargaining targets: Not being pressed seriously as a "demand," but something Mine-Mill's campaigning "toward," is a six-hour day and 30-hour week in nonferrous mining. (Walter Reuther's CIO United Automobile Workers' Convention branded such an objective "at this time" as Communist inspired.) Also: Union shop and "strong" FEPC and safety clauses. The contract bonus system will be discussed at a conference at Butte, Mont.

Guaranteed annual wage? Mine-Mill policy makers are silent on the annual wage goal set by the CIO steel and auto unions. This, too, is in the future. Steelworkers can't raise the issue in basic steel until next year; auto workers not until 1955. David McDonald, new steel union chief, has disclosed his union will seek a "comprehensive prepaid medical care program" next year. (The contract is open this year only on wage rates.) He would have employers pay for all medical, dental, drug and hospital bills.

National emergency injunction will stay: The injunction in emergency strikes will not be taken out of Taft-Hartley. There is a chance, though, that it may be for indefinite duration, rather than a specific 80 days. And Congress may give Eisenhower several alternatives for coping with an emergency strike threat. There is strong sentiment for this in the House. But Eisenhower may not be so quick to use the injunction to prevent a copper strike—unless it would seriously threaten our security at the time.

More indictments of communist unionists promised: The Justice Department got an indictment last month against Hugh Bryson, head of the Marine Cooks and Stewards Union, for signing a false non-Communist affidavit. More arrests were promised the Senate Labor Committee by Warren Olney III, new Assistant Attorney General in charge of the criminal division. Olney, giving his "personal" views, criticized the non-Communist affidavit as "a boon" to Communist-dominated unions. At the same time, however, he attacked the Goldwater-Rhodes Bill (see page 96) as too slow to be effective. Olney favors voiding existing certifications of left-wing unions and denying them access to the National Labor Relations Board.

OPERATING IDEAS



LABORATORY WORKERS have often expressed a wish to have rod-mill rolls that are quiet. Here is a design for rolls that are so quiet that you can barely hear them when the cover is down. Note insulation features of cover.

Rod-Mill Rolls that Are Really Quiet

J. J. BEAN, Mineral Dressing Laboratory, American Cyanamid, submits this interesting design of rod mill rolls which have been completed for use in the company's laboratories. Principal virtue of the rolls is that they are extremely quiet in operation—so quiet that the rod mill can hardly be heard when the cover is down. The only part that can be heard is the motor and drive. To lab men who have had laboratory mills dinning in their ears all day, this feature will be extremely attractive.

Another handy feature is the shelf in front which eliminates lifting of the mill since it can be rolled off the rolls and upended for removal of the rods, then turned on its side, and the contents discharged into the pan on the pan shelf. This shelf folds out of the way when not in use. The unit has an automatic timer which proves to be quite convenient, although not entirely necessary.

Details of the rod mill construction are also included in this article.

(Continued on page 124)

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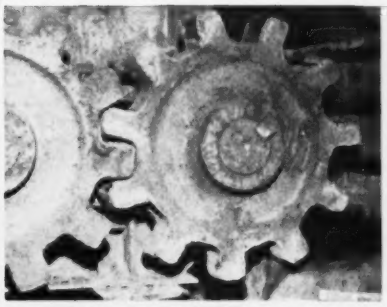

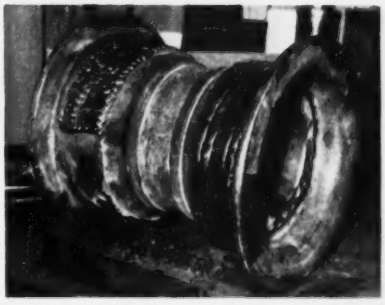

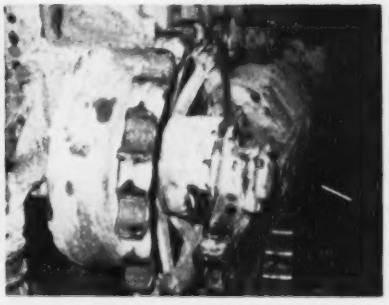

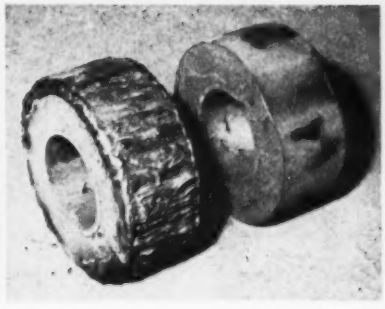

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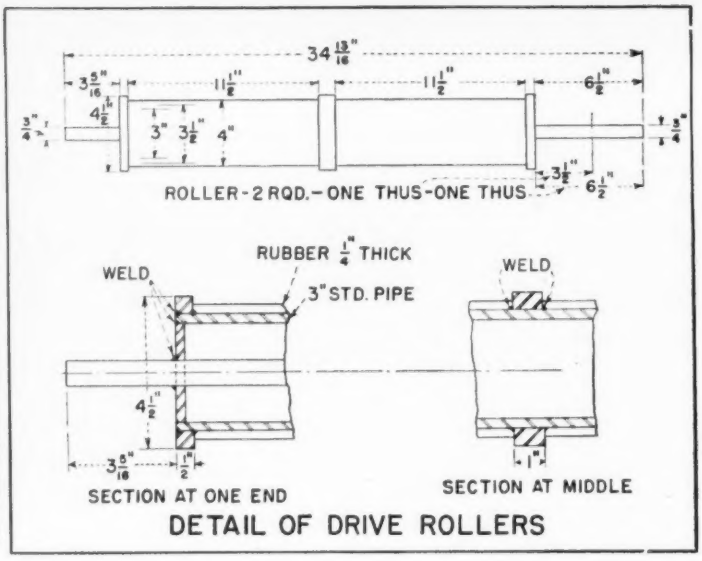

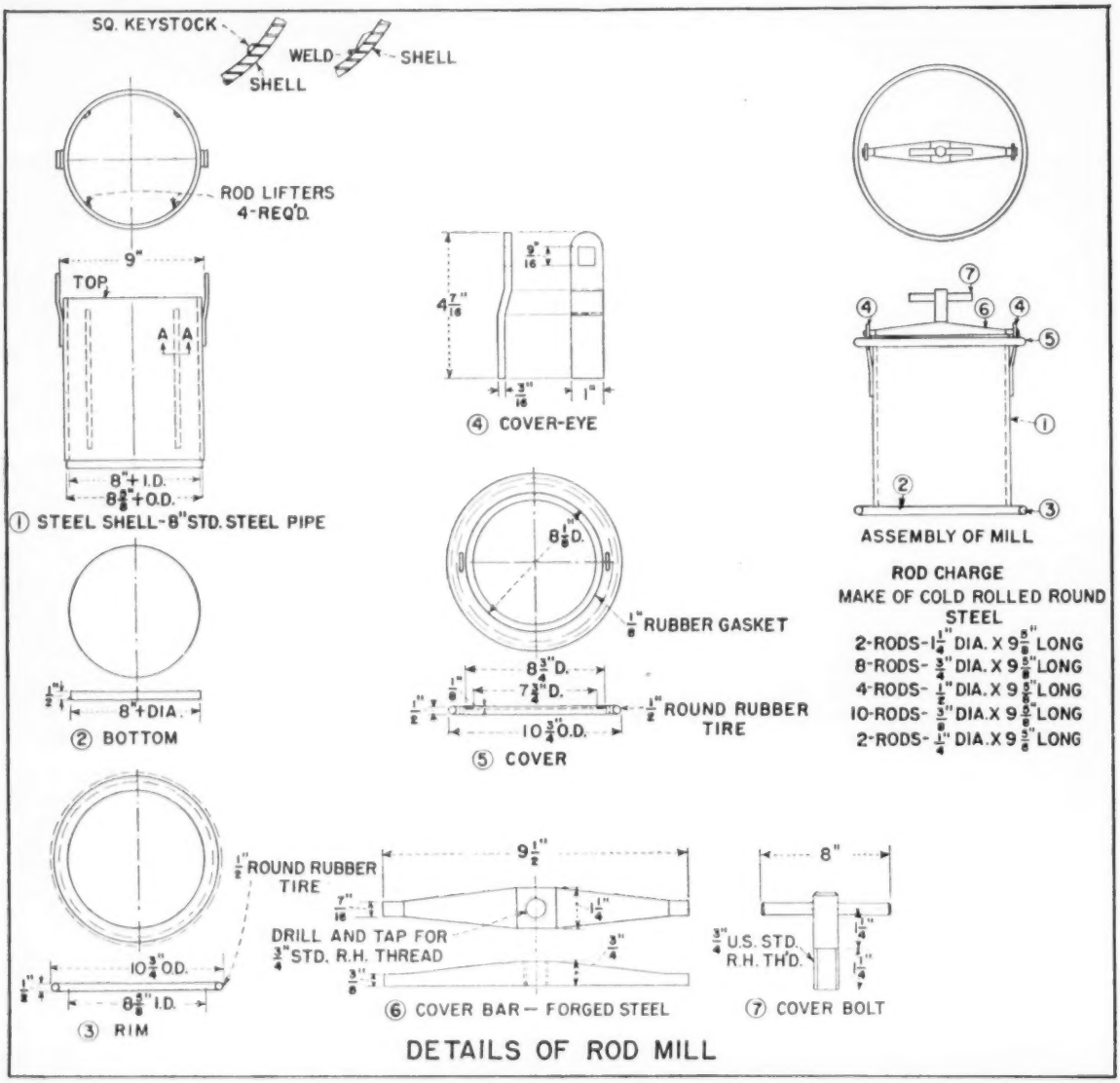

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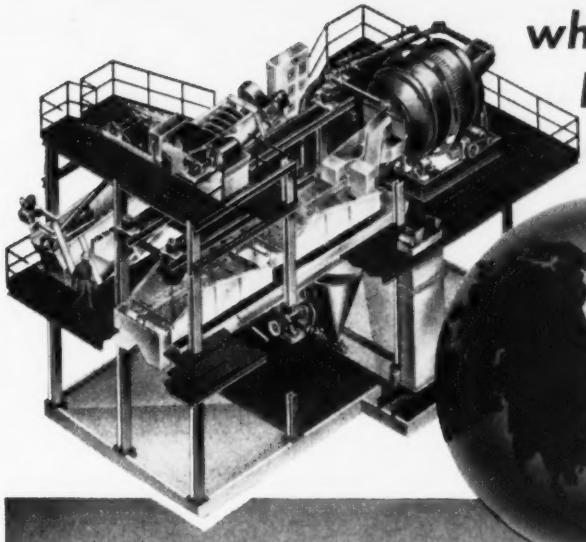
10-RODS- 1/2" DIA. X 9 5/8" LONG
2-RODS- 1 1/4" DIA. X 9 5/8" LONG



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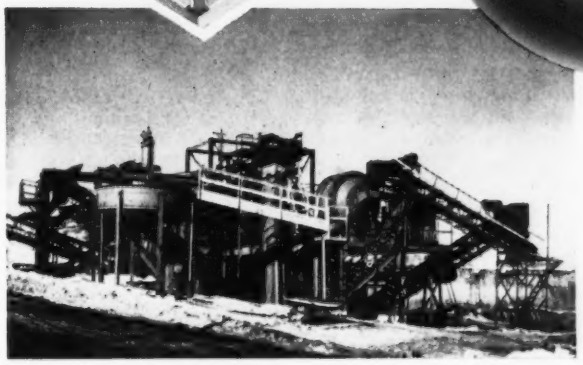

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PERSONAL NEWS

A. H. HUBBELL has been appointed senior associate editor of E&MJ, and A. W. KNOERR becomes managing editor. MR. HUBBELL, a graduate of the School of Mines of Columbia University in New York City, joined the staff of E&MJ in 1917, and has held the post of managing editor since 1922. He moves to the position of senior associate editor in order to devote his full time to coverage of the iron ore mining industry and of mining practice in general. MR. KNOERR joined the staff of E&MJ in 1944. He is a graduate of the Wisconsin Institute of Technology and of the Missouri School of Mines. Prior to joining E&MJ, he served as a mining engineer on the staffs of Sunshine Mining Co., Kellogg, Idaho; Idarado Mining Co., Ouray, Colo.; and other western mining operations.

J. B. Haffner, vice president and general manager of Bunker Hill and Sullivan Mining & Concentrating Co., Kellogg, Idaho, has been elected president of the Lead Industries Association. Mr. Haffner succeeds **Felix Edgar Wormser,** vice president of St. Joseph Lead Co., New York, N. Y., who has been nominated by President Eisenhower to become assistant secretary of the Interior for Mineral Resources. **K. C. Brownell, J. A. Martino,** and **J. M. Bowlby** have been elected vice presidents; **R. L. Ziegfeld** was reappointed secretary-treasurer. On the executive committee are: **J. B. Haffner, K C. Brownell, J. A. Martino, George Mixter, J. M. Bowlby** and **Andrew Fletcher.** These men were also named to the association's board of directors.

Guy N. Bjorge has retired as general manager of Homestake Mining Co., Lead, S. D., but will continue to serve as a director and vice president in the San Francisco area. Mr. Bjorge, with the company for 21 years, came to Lead in 1932 as assistant manager and became general manager in 1936. **A. H. Shoemaker** will succeed Mr. Bjorge. Mr. Shoemaker, a veteran of three years in a Japanese concentration camp, was manager of the Triumph Mining Co. For two years he was president of the Idaho Mining Association before joining the Homestake company.

Rowland H. George, member of the investment firm of Wood, Struthers & Co., New York, N. Y., has been elected a director of The American Metal Co., Ltd., succeeding the late **Norman Hickman.** Elected vice presidents were the following company executives: **Thomas W. Childs, Herbert S. Cohen, Hugo de Neufville, Ernest T. Rose, Hans A. Vogelstein** and **Jean Vuillequez.**

L. F. Paddison, mining and geological engineer with the United States Smelting Refining and Mining Co. at Boston, Mass., has retired. With the company since 1914, less two years with Magma Copper Co., Mr. Paddison has been active in exploration and operating work in the United States, Canada, and Mexico and will continue to engage in a limited amount of consulting work.

Chester H. Steele, Butte, Mont., vice president in charge of western operations of the Anaconda Copper Mining Co., has been elected a member of the board of directors of the Montana Power Co.

Fred Sutter, formerly superintendent of M. A. Hanna's Clifton mine in northern New York, has been appointed claims manager of the Michigan district for the company, with headquarters at Iron River. This follows the retirement of **Percy A. Carmichael,** who had been with the company for 36 years.

John E. McMynn will become superintendent of mines, north central district for The Consolidated Mining and Smelting Company of Canada, Ltd., Trail, B. C. Presently Cominco's property superintendent at the H. B. mine, Mr. McMynn succeeds **C. E. White,** who is resigning

R. B. Fuller, manager of the Florida phosphate department of International Minerals & Chemical Corp., will be promoted to vice president in charge of the phosphate division effective July 1. **F. B. Bowen,** now manager of the Tennessee phosphate department, will succeed Mr. Fuller; and **C. Lester Richards,** presently assistant manager of the Tennessee phosphate department, will succeed Mr. Bowen as manager of that department.

Dr. R. Genders of London, England, has been appointed metallurgical consultant to Vanadium Corporation of America. Dr. Genders is deputy director of Metallurgical Research at the Royal Ordnance Factory, Woolwich, which deals with metallurgical problems of Britain's Army, Navy, and Air Force.

G. Don Emigh has been appointed to the newly created position of director of mining for Monsanto Chemical Co.'s phosphate division. Mr. Emigh has been production superintendent for the Soda Springs, Idaho, operation, and will now have headquarters in St. Louis, Mo.

George Hollinger has been appointed industrial relations superintendent at Southwest Potash Company, Carlsbad, N. M. He succeeds the late **Ward Tuttle.**

GEORGE H. CLEAVER, has joined *E&MJ Metal and Mineral Markets* as assistant editor. Mr. Cleaver, who holds an A.B. in economics from the University of Cincinnati and has done graduate work at the University of Chicago, has been assistant professor of economics at Bard College, Annandale-on-Hudson, New York. Prior to that, he was an economic analyst on the research staff of the Federal Reserve Board and during the war, served 3½ years in the Army as a statistician in the War Plans Section, Central Pacific Base Command, Honolulu.

Philip D. Pearson, superintendent of Inland Steel Co.'s Menominee Range operations, Iron River, Mich., is now manager of Inland's subsidiary, Caland

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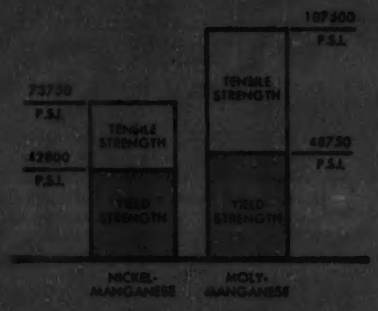
The new moly-manganese electrode that's better than nickel-manganese rods for build-up and repair



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Ore Co., Steep Rock, Ont. Mr. Pearson will continue to live in Iron River. **E. W. Whitman** has been appointed chief engineer for Caland and will leave shortly for Steep Rock.

Dr. Phil J. Shenon, Salt Lake City consulting geologist and former dean of the school of mines at the University of Utah, has been elected to the board of directors of Day Mines, Inc., Wallace, Idaho. **Robert P. Dwyer** has been appointed attorney. Dr. Shenon succeeds **Paul B. Jessup,** who resigned to join Kennecott Copper Corp., New York, N. Y.

J. H. Devlin has been appointed industrial relations superintendent at the International Minerals & Chemical Corp. potash division at Carlsbad, N. M. Mr. Devlin succeeds **W. C. Healey,** who has resigned to join Standard Oil Company of New Jersey.

Dr. F. M. Van Tuyl, head of the geology department of the Colorado School of Mines in Golden since 1919, will retire this summer with the rank of professor emeritus. Dr. Van Tuyl is credited with being one of the first to recognize the application of engineering to geology. Mostly through his efforts, the school became in 1922 the first in the world to offer a degree in geological engineering. **Dr. L. W. LeRoy,** professor of geology at Mines since 1942, will succeed Dr. Van Tuyl.

Scott Turner, mining engineer, ex-director of the United States Bureau of Mines, who directed the first commercial coal mining within the Arctic Circle, has been elected president of the American Institute of Consulting Engineers, New York, N. Y.

Frederick C. Green, former Utah Copper millman, has been appointed assistant general manager of the Utah Copper Division, Kennecott Copper Corp., Salt Lake City. Mr. Green joined Kennecott in 1924 at the Magna mill, and has served at the Arthur and Chino Mines Division.

Clarence W. Moore has announced the establishment of an office at Habana specializing in mineral and petroleum leases, and offering public relations and investment counsel. Address: Edificio Lafayette, O'Reilly y Aguiar. Dep. 402-403, Habana, Cuba.

The Western Montana Exploration and Development Co. of Missoula, Mont., has retained **Frank Eichelberger** of Spokane, Wash., as consulting engineer and metallurgist to assist its resident engineer, Francis A. Hancock.

Robert Pete Holloway, formerly employed by International Smelting and Refining Co. of Salt Lake City, Utah, as a geologist in their Halloysite mine, is now with Hersey Inspection Bureau, Oakland, Calif., as a geologist.

Russel B. Caples, manager of Anaconda's Great Falls, Mont., reduction department since 1941, has been elected president and director of the Anaconda Aluminum Co., New York, N. Y., subsidiary of Anaconda Copper Mining Co., and will continue to manage the zinc contract negotiations for the Montana zinc plants of the parent company. Mr. Caples, who holds a D.E. from the Missouri School of Mines, has been president of the American Zinc Institute and is a director of the AIME. He succeeds **Francis O. Case,** who recently resigned to become president of the Glen Alden Coal Co. **Floyd S. Weimer,** general superintendent of the Great Falls reduction department, will succeed Mr. Caples as manager of that plant. **Thomas K. Graham,** assistant general superintendent of the reduction department, will take over Mr. Weimer's duties as general superintendent.

Byron F. Wagner has succeeded **S. J. Sicotte,** retired, as safety inspector for Pickands, Mather & Co.'s Minnesota mines. . . . **Harry G. Gerber,** research engineer, is now with the company on the Mesabi Range. He was formerly with Zontelli Brothers on the Cuyuna. . . . **Richard Mann,** engineer at Pickands, Mather's Hibbing office on the Mesabi, has been transferred to the Sagamore mine on the Cuyuna where he succeeds **T. F. Rundle,** retired. . . . **L. E. Kienitz,** engineer in the company's Cuyuna Range office, has resigned to go with U. S. Gypsum Co. at Alabaster, Mich.

Fred D. DeVaney, with **B. W. Bernstrom** and **Donald M. Chisholm,** all of Pickands, Mather & Co., have recently returned from a seven-week trip to iron mines and plants in Norway and Sweden.

Thomas O. Olsen has been made general plant foreman of the Gross-Marble concentrator of U. S. Steel's Oliver Iron Mining Division at Marble, on the Mesabi Range. . . . **William A. Hyde,** mill engineer at the Oliver's Mountain Iron mine, has been appointed assistant superintendent of maintenance for the company's eastern Mesabi division. . . . **Vernon V. Ahola,** mill engineer, has been promoted to general plant foreman at Oliver's Trout Lake concentrator at Coleraine. . . . **Alfred F. Savage,** pit foreman at the Arcturus mine, has been appointed assistant superintendent at Oliver's Walker-King mine at Coleraine. **Rex L. Lane** has been made pit foreman.

G. A. Borgeson has been appointed manager of the safety and claims department of M. A. Hanna Co.'s iron mining division. He succeeds **Percy A. Carmichael,** Iron River, Mich., who retired April 1 after 36 years with the company. Mr. Borgeson will continue to keep his home and office in Hibbing, on the Mesabi.

Richard C. Annear, mine captain at Inland Steel's Bristol mine, at Crystal Falls, Mich., has been transferred to the company's Morris mine at Ishpeming as operating engineer. **Peter J. Ropiak** succeeds him as captain at the Bristol. . . . **Wayne J. Ahl,** Inland's Menominee Range engineer, has been transferred to Greenwood mine at Ishpeming as operating engineer.

C. E. White, formerly superintendent, north central district, Consolidated Mining and Smelting Co., Montreal, Que., has been appointed general manager, United Keno Hills Mines, Ltd., Toronto, Ont.

Tom Lyon, Salt Lake City, Utah, has been named director of the Bureau of Mines. Mr. Lyon has been with the Defense Materials Procurement Agency as director of domestic minerals expansion.

C. B. Foster, general superintendent of the Lepanto Consolidated Gold Mining Co., Manila, P. I., has been awarded a gold medal by Labor Secretary Jose Figueras in recognition of his services as distinguished and exemplary employer, his second award of the kind.

ANNOUNCEMENT

The United States Civil Service Commission has announced an examination for mining engineers for filling positions paying from $3,410 to $10,800 a year in the Bureau of Mines of the Department of the Interior in Washington, D. C., and throughout the United States. Positions in other federal agencies may also be filled.

No written test is required but applicants must have had appropriate education or experience or a combination of both.

Applications will be accepted until further notice and must be filed with the Board of U. S. Civil Service Examiners, Bureau of Mines, U. S. Department of the Interior, Washington 25, D. C.

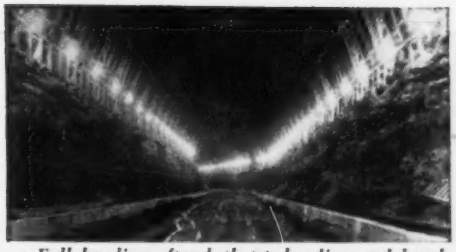
Full information and application forms may be obtained from the U. S. Civil Service Commission, Washington 25, D. C., or from most first- and second-class post offices.

OBITUARIES

Dr. Emanuel Alexander Goldenweisser, 69, an authority on gold and finance, died April 1 in Princeton, N. J. Dr. Goldenweisser retired recently as president of the American Statistical Association and the American Economic Association. He was for many years author of the gold review in *E&MJ's* annual review.

Cecil G. Rigstad, 54, assistant general superintendent of Interlake Iron Co., Duluth, Minn., suffered a fatal heart attack on March 14.

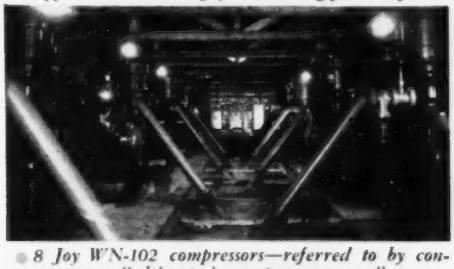
E. H. Horne, 87, one of the most famed names in Canadian prospecting, died at his home near Enfield, N. S., on March 16. Discoverer of the Noranda mine, Mr. Horne later formed



Full heading after both top heading and bench have been excavated. Excavated dia.—51 ft.

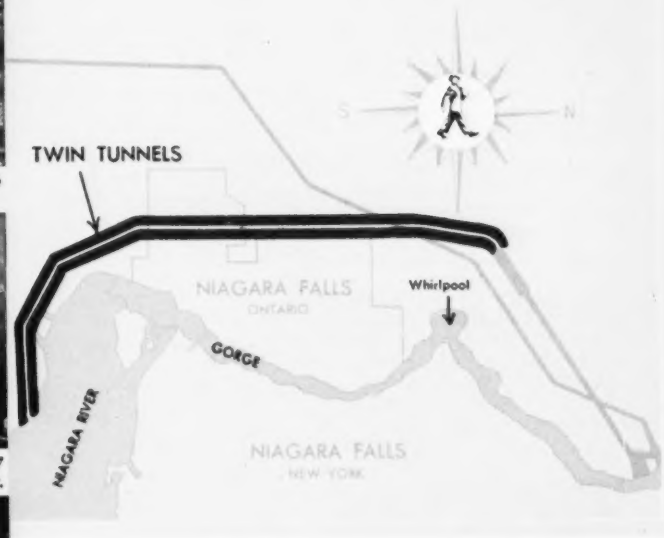
Main Jumbo for driving top heading—mounts 17 T-350 long-feed drifters on Joy Hydro Drill Jibs.

Jumbo for bench drilling—suspended from roof supports—mounts 13 Joy T-350 long feed drifters.



8 Joy WN-102 compressors—referred to by contractor as "ultimate in compressor usage."

Series 1000 Axivane Fans in ventilation arrangement. Tracks permit adding fans as desired.



PROGRESS REPORT ON THE WORLD'S LARGEST TUNNEL

SIZE: Twin Tunnels 51' Dia., 5½ mi. length.
LOCATION: Niagara Falls, Ontario.
EQUIPMENT USED: (All Joy Installation):
114 T-350 Drifters on LW-6A Feeds on Hydro Drill Jibs.
24 WN-102 Semi-Portable Air Compressors.
Series 1000 Axivane Fans—added as needed to maintain air volume.

The world's largest tunnel is being bored out of *solid rock* with the help of Joy rock-drilling equipment, ventilating fans and air compressors.

4,375,000 cu. yds. (9,923,000 tons) of rock will be excavated to form the huge twin tunnels. These 5½ mile tunnels will convey water from the upper Niagara River beneath the city of Niagara Falls, Ontario, to a point near the Whirlpool Rapids, well below the Falls. Water thus diverted for hydro-electric power purposes would supply the water needs of 200 million people!

This is the first large tunnel operation where drilling has been mechanized. The "All Joy Equipment" installation confirms Joy's position as leader in the heavy construction and tunneling equipment market. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

W&D C-4587

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

the Tremoy Lake Shore Syndicate which financed the work for two years. Tremoy sold out to what became Noranda mines.

John A. Ferguson, 89 a prominent figure in mining on the Forest Hill Divide, died March 19 in his Auburn, Calif., home. Since his retirement 15 years ago, he served as a mining consultant.

J. Power Hutchins, internationally-known placer mining engineer and consultant, died recently in San Francisco, Calif., aged 79.

Wallace K. Smith, 58, Anaconda, Mont., superintendent of the surface department of the Anaconda reduction works of the Anaconda Copper Mining Co., died March 14 in Harrison, Mont. Mr. Smith joined Anaconda in the concentrator department in 1911 and later served as foreman of the phosphate department.

STOREY BUCK, Spokane, Wash., for over 30 years faithful staff correspondent for E&MJ, passed away April 12. Mr. Buck spent most of his life on *The Chronicle* staff, retiring Dec. 1, 1948, and was editor of the Lewiston Tribune for a time and life member of the Spokane Press Club. He served two terms in the state legislature, 1901 and 1931, and was one of the early secretaries of the Spokane Chamber of Commerce.

Capt. Harold Fraser Roche, 74, died March 31 in Los Angeles, Calif., after a career as a gold mining engineer and metallurgist. A graduate of Oxford University and the Royal School of Mines, he carried out his mining activities throughout the British Commonwealth and in southern California, Idaho and Oregon.

Frank G. McClure, 63, was killed in an accident at the Miami Copper Co., Miami, Ariz., on March 2. A graduate of the University of Arizona School of Engineering, Mr. McClure worked as an engineer for Phelps Dodge Corp., Bisbee, Ariz., at various mines in Colorado and Utah—leasing, engineering, and contracting—and did subcontracting and supervisory work for the Six Companies, Inc., at Boulder Dam. For the past 16 years he has been an engineer for Miami Copper.

F. A. Beauchamp, 69, San Francisco metallurgical engineer, died suddenly in Dayton, Ohio, on March 20. Mr. Beauchamp, with Hamilton, Beauchamp & Woodworth for 30 years, was chief metallurgist with Equipment Engineers, of San Francisco.

Joseph S. Peterson, recently retired vice president and assistant general manager of Benguet Consolidated Mining Co. in Baguio, Philippine Islands, died March 13 in Altadena, Calif. A graduate of the Minnesota School of Mines, he was general superintendent of mines in Colorado and Mexico before moving to the Philippines in 1937.

LETTERS TO THE EDITOR

Dear Mr. Ramsey:

In studying the paper by A. C. Dorenfeld published in your October 1952 issue with the title "A New Way to Get Better Results, Save Money in Mill Testing," I noticed two arithmetical errors which I believe worthwhile bringing to your notice.

On page 82, discussing the conclusions which would be drawn by using the current standard procedure of assessing the effect of variables, the author makes two mistakes:

(1) Effect of xanthate: 86.12 — 82.61 = 3.51 and not 5.51 as stated.

(2) Effect of grinding: 86.12 — 72.07 = 14.05 and not 24.05 as stated.

Table 6 therefore becomes the following:

Variable	Effect on Cu Recovery — Standard Method	Factorial Method
pH	22.83	17.38
Grind	14.05	11.10
Xanthate ...	3.51	Within exp. error

The difference in the results obtained by the two methods are not striking as the author declares. On the contrary, the difference is rather small. Anybody with experience in laboratory or mill testing, would consider, regarding particularly the small number of tests, that the two sets of conclusions are pretty much the same.

I believed it useful to call your attention to the above.

A. WACK

Inspector of Mills
Societe Miniere et
Metallurgique, Paris

Dear Mr. Wack:

I received a copy of your letter concerning my paper, "A New Way to Get Better Results, Save Money in Mill Testing".

I wish to thank you for calling my attention to the arithmetic errors. I assure you it was an oversight in my proofreading the article.

In so far as you comment that the differences in results are not striking, I take the position they still *are*. Read page 82 again. The evidence is: (1) Standard method showed a difference due to xanthate, which of course, is not the case at all. The difference is a chance result; (2) A 3% to 5% difference in recovery is of tremendous significance economically. It may mean the installation of expensive equipment (such as grinding) that is not justified economically.

It must be borne in mind that the tests presented, and variables selected, were for illustrative purposes only.

Thus, easily changed conditions (and relatively inexpensive) such as pH or xanthate, could very well have been flotation vs. leaching, smelting, etc. where a mistake could be costly —the poorer process, in the long run, could be chosen.

You are correct in stating that the number of tests were small. Notice, however, that the standard deviation of each test result is obtained from all *eight* tests, (the square root of the residual) in the Factorial Method. For equivalent precision, by the standard procedure, eight tests for each condition would have to be made—or 64 tests in all! Thus, these tests, properly designed, are equivalent to 64 tests improperly designed!

I grant that test work in mining company laboratories is relatively inexpensive—but full-scale mill tests are extremely expensive. Further, at least in this country, I have seen many conclusions based on one o two laboratory tests—strange as this may seem to you. This experience was over a 10-year period in large western U. S. metal mills.

A. C. DORENFELD

Assoc. Professor
Mineral Engineering
University of Alabama

Dear Mr. Ramsey:

We thought you would like to have us call your attention to an error in the March issue of the *Engineering and Mining Journal.*

"A man was instantly killed at the Peterson mine at Bessemer when he looked into the cage compartment and his head was caught between a divider and skip. This is a type of accident that has occurred many times during the years."

This accident occurred to a contractor's employee during the construction of a new building at the Peterson mine at Bessemer, Mich. The man was caught between the open elevator platform and plank crossbracing between the uprights of the elevator shaft or framework. This was an automatic electric hoist and of the type which is usually used by contractors for hoisting material on a construction job.

The article inferred that this was an accident that occurred in the hoisting shaft of the mine.

AL KOLU

Pickands Mather & Co.
Duluth, Minn.

HOW ADVANCED DESIGN

Makes Allis-Chalmers Tractors more dependable

These heavy-duty tractors have toughness and ease of servicing to match their outstanding performance ability. Here are some of the advanced design features that provide extra strength and protection — keep Allis-Chalmers tractors on the job more hours:

1. **One-Piece, All-Welded Structural Main Frame . . .** strong and firm without a single ounce of excess weight — absorbs all vertical and horizontal stresses.

2. **Extra Large Idler and Sprocket** eliminates rocking action, puts more track on the ground for greater stability and better traction.

3. **Spring-Loaded, Positive Seal** keeps dirt, moisture and grime from damaging truck wheels, idlers and support rollers . . . you lubricate them only once every 1,000 hours.

4. **All-Steel, Welded A-Frame Track Stabilizer** permits free track oscillation, yet keeps tracks rigidly in line and absorbs thrusts and twists from shock loads and working on uneven terrain.

5. **Oil Enclosed Track Release Mechanism** reduces track maintenance and breakage. An adjustable screw lock provides positive holding action that maintains adjustment at required setting.

6. **Engine Not Used as Structural Member** — no strain is transmitted to it. Engine weighs less per horsepower developed, because of 2-cycle design — has modern unit injection.

UNIT CONSTRUCTION SAVES SERVICE TIME

With Allis-Chalmers *unit construction*, major assemblies are easily removed without disturbing related assemblies. This brings real savings in time and money, puts tractors back to work faster. It assures better inspection and maintenance, too. Servicemen find it easy to remove major parts to correct trouble before damage develops.

Let your dealer tell you more about the toughness of Allis-Chalmers tractors, their time-saving unit construction — and their unequalled lugability and work power.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

THIS MONTH

TEST BORINGS with auger bits have revealed a 40-million ton nickel deposit at Moa Bay, Cuba.

40 Million-Ton Discovery in Cuba Could Make Freeport 2nd Largest Nickel Producer

WITH THE ANNOUNCEMENT of the discovery of 40-million tons of ore containing 1.35% nickel and 0.14% cobalt, at Moa Bay some 500 mi. east of Havana, Freeport Sulphur Co. is back in the nickel business in a big way. Sometime in 1955 is the tentative date for the start of production, and Freeport is thinking in terms of an initial minimum plant capacity of 30-million lb. of nickel per year and about 3-million lb. of cobalt.

Depending on actual production plans at Falconbridge during the term of that company's agreement with the U. S. government, probably about 35 million lb. per year, eventual capacity at Moa Bay could make Freeport Sulphur the world's second largest nickel producer. International Nickel is first with an annual production of about 250-million lb. Ore reserves at Moa Bay are the largest in the Free World outside of Canada.

Like Nicaro, 40 mi. west, from which the company produced nickel oxide during World War II, the Moa Bay deposit is a laterite. The main constituent of the ore at Moa Bay, however, is limonite and the grade is higher. The absence of serpentine in the ore makes it practical to produce a metal instead of the oxide which was produced at Nicaro, and is now being produced there at the rate of 2-million lb. a year by Nickel Processing Co.

Treatment of Moa Bay ore calls for leaching with sulphuric acid under conditions that will leave the iron content undissolved. (At Nicaro, presence of magnesia from the serpentine, made such a treatment unworkable.) Chemical Construction Co. has been called in to work on the process and the nickel-cobalt solution will be treated by the Chemico process much the same as is being adapted by Howe Sound at Blackbird, and Sherritt-Gordon. Equipment for the pilot plant has been ordered and testing should be under way in six months. Since much work has been done on the process, Freeport officials are optimistic in predicting a minimum of pilot plant work to obtain basic design data for full scale operation.

Langbourne Williams, Freeport president, stated flatly that this is strictly a commercial venture; that the project could exist in a competitive market. He made it clear, however, that Freeport stockholders could not expect to receive a return from this venture for a substantial number of years. Mr. Williams did emphasize the discovery's importance to the nation's interests, pointing out that nickel is virtually the only important metal whose supply at present does not meet military requirements.

No comment has been made on the amount of Freeport's investment. The company probably will seek rapid amortization for any plant they build but a purchase agreement with the U. S. government or a price floor has not been broached.

The Cuban Government has expressed interest in giving full cooperation and has stated, ". . . the President has the firm intention of encouraging the investment of capital on the part of responsible foreign firms for which the government will always offer full guarantee."

New Hill-Annex Plant Will Handle Low-Grade

THE NEW CONCENTRATOR at the Hill-Annex mine of Jones & Laughlin Steel Corp., at Calumet on the Mesabi, is to be ready for this season. It will contain a Heavy-Media unit, in addition to the usual straight washing unit, to handle lower-grade material which forms a large percentage of the mine's remaining ore. It is near the pit and its crude ore will be supplied by belt conveyors. The electric locomotives, which hauled Hill-Annex ore from pit to washing plant for many years, and the rail and trolley wire used for the haulage track will be disposed of.

The old plant has been dismantled. Most of its equipment that is not incorporated in the new one will go to J. & L.'s Lind-Greenway operation, east of Grand Rapids, Minn. Stripping is under way at the Greenway, which is expected to begin shipping this season.

Stripping was continued at J. & L.'s Schley mine at Gilbert, on the eastern Mesabi during the winter. This former underground mine will be a good producer as an open pit in 1953. The company's Columbia mine, at Virginia, and the Longyear at Hibbing are prepared for shipping. The Wentworth, farthest east on the Mesabi of all J. & L. properties, will also ship during the 1953 shipping season.

IN MINING

MILL AND HEADHOUSE of Weedon, Pyrite & Copper Corp., Weedon, Quebec.

W. WALKER, ASSISTANT MILL SUPERINTENDENT checks copper concentrate filter.

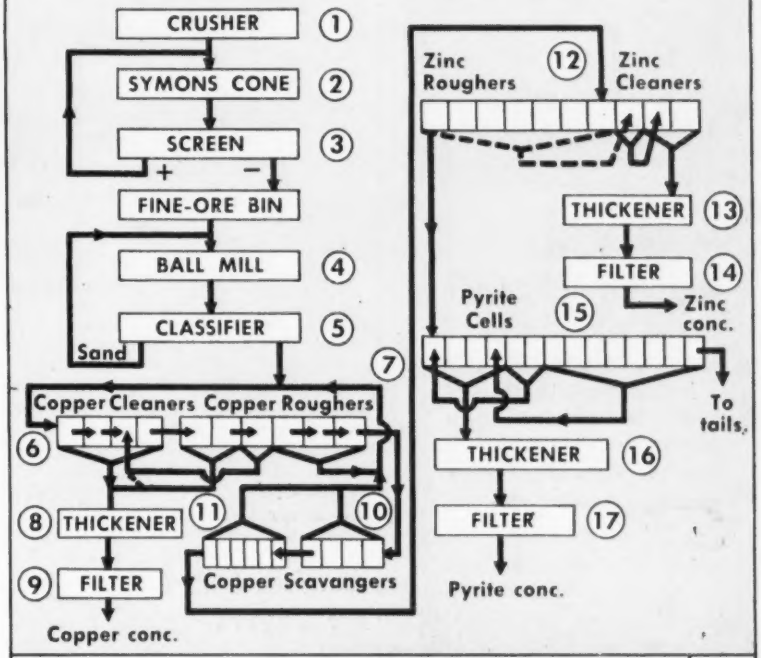
Weedon Pyrite Plant Mills 220 Tons per Day

WEEDON PYRITE & COPPER CORP., LTD., operations at Weedon, Quebec, have gone through a rugged shake-down period for the past five months during which metallurgical techniques have undergone constant improvement. The zinc circuit was scheduled to start up in mid-April, and the present flowsheet of that part of the milling operation is subject to further refinement. The mill now processes some 220 tons of ore daily to produce 115 tons of pyrite concentrate plus 18 tons of copper concentrate. Mill feed runs about 2.0% copper, 65% FeS, and about 1.5% Zn. Recently good-grade ore has been encountered in stope preparation on the 9th level, showing an average of 5.39% copper across 5.9 ft. The ore shoot at this horizon has a total length of 250 ft.

Roy Robertson, of Montreal, is president of Weedon Pyrite & Copper Corp., Ltd.; G. F. MacDonnell, of Toronto, is vice president and managing director; and G. A. Runge is manager of the company.

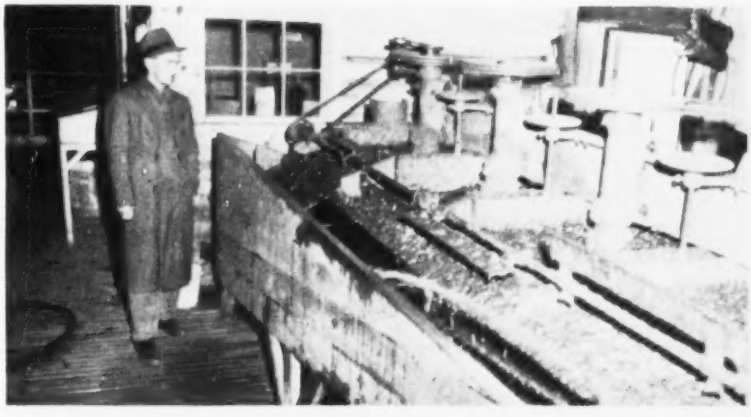
(Continued on page 134)

FLOWSHEET — WEEDON PYRITE & COPPER CORP., LTD., WEEDON, QUEBEC



LEGEND

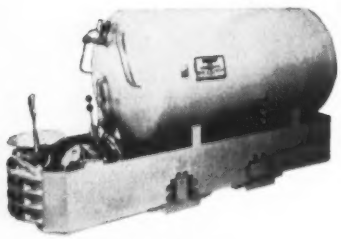
1. Buchanan jaw crusher, 24x13-in.
2. Nordberg Symons 3-ft. cone crusher
3. Dillon screen, closed circuit.
4. Dominion 7x8-ft. ball mill.
5. Dorr double-rake classifier.
6. Four No. 18 Denver Special flotation cells.
7. Six No. 21 Denver cells.
8. Denver thickener, 20-ft.
9. American Disc filter, 6-ft. dia.
10. Four No. 18 Denver Special cells.
11. Six No. 21 Denver cells.
12. Ten No. 18 Denver Special cells.
13. Denver thickener, 20-ft.
14. American Disc filter, 6-ft. dia.
15. Fourteen No. 21 Denver cells.
16. Denver thickener, 24-ft.
17. American Disc filter, 8 ft. 6in. dia.



J. E. KEELEY, MILL SUPERINTENDENT, inspects copper circuit.

MORE TONS HAULED FARTHER ON LESS AIR

Eimco two-speed air locomotives can haul more tons a greater distance on less air than any single speed air locomotive.



Start the load in low gear, then shift immediately to high with the constant mesh transmission and save on air.

Every Eimco has a tested*, registered receiver along with numerous other advantages.

Write for more information.

*A.S.M.E. Code

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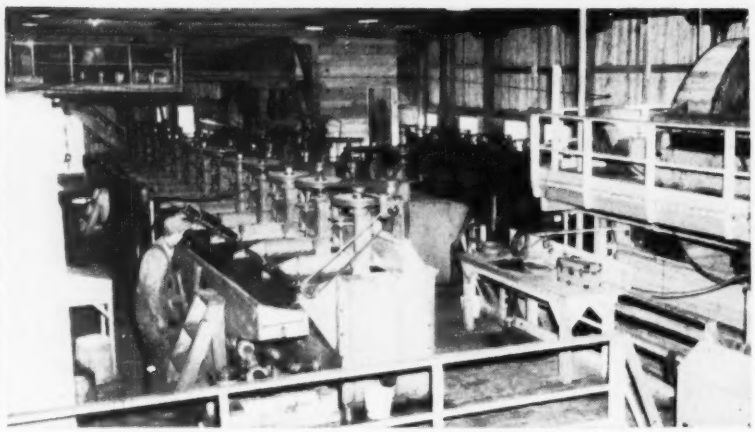


COPPER-PYRITE-ZINC flotation section operates on 44 Denver cells.

REAGENTS USED

Ball Mill. Lime to give a copper feed pH of 10.3 to 10.6.

Classifier Overflow: Pine oil 0.04 lb. per ton; Reagent No. 350, 0.125 lb. per ton.

Copper Rougher: Reagent No. 343, 0.047 lb. per ton; Reagent No. 350, stage fed, 0.140 lb. per ton.

Copper Scavenger: Reagent No. 350, stage fed, 0.186 lb. per ton.

Zinc Conditioner: Copper sulphate, 0.5 lb. per ton.

Zinc Cleaners: Lime to give pH of 12.0; sodium cyanide, 0.0023 lb. per ton.

Pyrite Conditioner: Soda ash, 4 lb. per ton; Reagent No. 343, 0.155 lb. per ton.

Pyrite Roughers: Reagent No. 343, stage fed, 0.232 lb. per ton.

Note all reagent numbers above refer to American Cyanamid Co. flotation reagents.

Another Iron Ore Project for Ungava

FENIMORE IRON MINES, LTD., Toronto, Ont., is planning to develop its iron ore holdings in the northern section of Labrador Trough, on Ungava Bay. Chairman of Fenimore is H. A. Strain, formerly in charge of raw materials for Carnegie Illinois Steel Co. Dr. J. A. Retty is president. Dr. Retty previously was chief geologist for Hollinger Consolidated Gold Mines Ltd. and played a major role in the discovery for Hollinger of the huge reserves of iron ore in Labrador and Quebec that underlie the operation of Iron Ore Co. of Canada.

Fenimore claims to have large open-pit reserves close to or on tidewater. Tonnage to date is estimated at over half a billion. No mention is made of grade of crude ore but the company states that processing tests on three different types of crude ore found indicate that a product 60% in iron can be made. Production and shipment, it is claimed, can be effected at a profit at current iron ore prices.

Confidence in Mesabi Shown by Great Northern

JOHN M. BUDD, president of the Great Northern Ry. Co., said recently that "in 1942 proven reserves on the Mesabi Range were 1,086-million tons. From 1942 through 1951 shipments totaled 612-million tons. Without additional reserves being proved, there would have been only 474-million tons left in the ground. Actual proven reserves on May 1, 1952, totaled 869 million tons, an increase of almost 400-million tons in ten years."

Great Northern has confidence in the Mesabi. Of the road's ore tonnage in 1952, 95% was hauled by diesel power; and G. N. added 700 new 75-ton ore cars to its equipment during the year.

Eight new diesel-electric locomotives on the Great Northern ore haul are being equipped to permit radio contact between engineers and conductors and between trains and stations. This is expected to result in greater safety and in saving delays.

Michigan Jasper To Be Treated at Republic

CLEVELAND-CLIFFS IRON CO. has announced plans for developing low-grade ore at its Republic mine in Marquette County, Michigan. It will build two concentrating units, each with an annual capacity of 200,000 tons.

The Republic was opened in 1871 as an underground mine. It reached a depth of 2,910 ft. and produced over 8½-million tons of high-grade ore. The new Republic mine is owned and will be developed by Cleveland-Cliffs.

This is the second project for mining and concentrating Michigan iron-bear-

ing jasper which Cleveland-Cliffs has undertaken; the first having been begun in 1951 by Cleveland-Cliffs and Ford Motor Co. at Humboldt, Mich. The Humboldt project was described in *E&MJ*, Feb., 1953, pp. 128-131.

Pilot Plant to Treat Florida Beach Sands

AN EXPERIMENTAL $100,000 pilot plant for processing fissionable and other minerals along the East Coast of Florida will be constructed near St. Augustine in the near future by the American Mining and Development Co. The company was granted an extension of time to a mineral lease along 100 mi. of coastline.

Plans of the company are to concentrate on ilmenite, rutile, zircon, thorium, and uranium from Florida sands. The operations are to be similar to those of the du Pont Co. at Starke, now operated by Humphreys Gold Corp.

Charles R. Randolph, head of American Mining and Development Co., said that the firm will construct a pilot plant and will incorporate a subsidiary in Florida to extend its exploration of potential possibilities in Florida minerals.

The lease provides that the state will get $1 a ton, or 3% of the sale price of the minerals mined, whichever is greater.

Carpco Engineering & Manufacturing Co., Jacksonville, will design and construct the plant. It will include a wet processing plant to separate the heavy minerals and metals from beach sand; a stationary drying plant, and a separation plant to include 40,000-v. separators to divide magnetic and nonmagnetic elements.

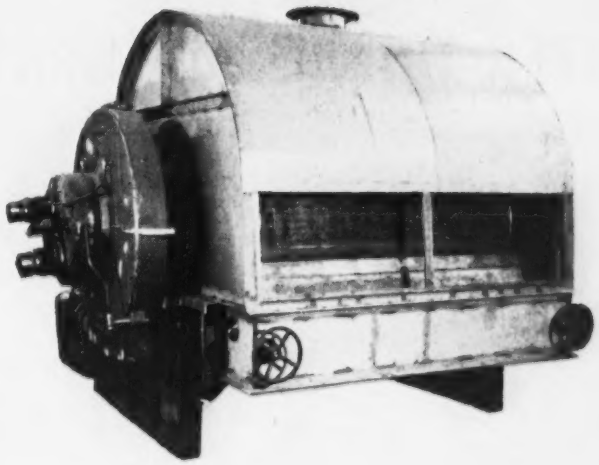
Provincial Asbestos Co. Ltd., Now Producing

PROVINCIAL ASBESTOS CO., LTD. is the newest producer of asbestos fiber in the Eastern Township's asbestos area which already produces more than two-thirds of the world supply.

Asbestos rock is now being mined on Provincial Asbestos Co., Ltd. property and milled at the leased plant of Continental Asbestos Co. at Coleraine, 10 mi. from Thetford Mines.

Milling results to date show an average of 10% of 3-Z fiber valued at $320 a ton, 15% of 5-R fiber valued at $110 a ton, 20% of 6-D fiber valued at $78 a ton, and 55% of No. 7 fiber valued at $45 a ton. The rock currently being mined shows an average asbestos content of 6.5%, an average value of $6 a ton against mining and milling costs of $3.75, which leaves an estimated profit of $2 a ton. Mill operating capacity at present is 500 tons of rock daily. Plans are presently under active consideration to either increase mill capacity to something like 1,000 tons daily and renovate the equipment for better recovery, or to

NEW VACUUM FILTERS FOR NEW PROCESSES



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Our testing and development department is staffed with chemical and metallurgical engineers whose long training and experience enables Eimco to offer filtration equipment exactly suited to your process.

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build a new mill of some 2,000 tons daily capacity.

Provincial Asbestos Co., Ltd., owns two properties about 1½ mi. distant. The No. 1 property, an area of 600 acres, has been diamond drilled to an extent of 29,500 ft., which out lined the general structure and the location of two possible ore zones, on one of which 6,145,000 tons of ore were blocked out, and inclined drilling indicated probable limits of 20-million tons. Additional drilling will be done on Zone 2.

Milling of bulk samples from surface pits on the drilled ore zone indicated asbestos recovery of from 7.88% to 11.73%, and average values of around $6.75 a ton.

The No. 2 property, also called the Windsor mine, is now being mined, and covers an area of 300 acres. The mining is an open-pit operation, with ore trucks descending a ramp to the bottom of the pit and the ore face being worked. Other workings consist of two exploratory tunnels each 120 ft. in length driven at the bottom of the pit to determine the extent of the ore, and one "crude" pit about 20 ft. by 20 ft. and 20 ft. deep.

Mahoning Iron Mine Wins Safety Award

THE MAHONING IRON MINE, at Hibbing, on the Mesabi, discovered in 1893, has produced 101,329,632 tons of ore. The first shipment was made in 1895. This year, 1953, will be its 59th of operation, ore having been shipped every year save during the depression. The best year was 1940 when 5,177,201 tons was shipped. The mine's peak 24-hour period occurred in 1937 with 55,456 tons. Overburden stripped has averaged 50 ft.

The Mahoning has won the "Sentinels of Safety" award seven times: in 1931, 1938, 1940, 1941, 1942, 1945 and 1947.

The National Safety Council's "Award of Honor" was given the Mahoning in 1952 for having operated 2,075,477 man-hours without a disabling accident. As far as the Council's records disclose, this is an all-time safety record for an operation of this kind.

All these awards have been won under the management of Pickands, Mather & Co., from 1923 to date. W. G. Brown was mine superintendent from 1925 until Jan. 1, 1953, when he retired and was succeeded by W. D. Webb.

Iron Ore for the Future At Mutun, Bolivia

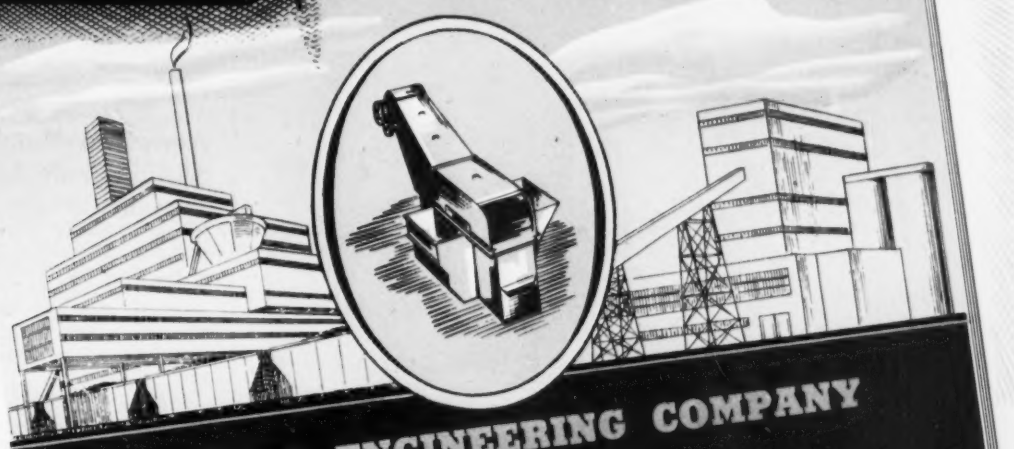
VERY LARGE TONNAGES of iron formation which some day may be classified as iron ore exist in the Mutun area in southeastern Bolivia, according to a preliminary report

BULLETIN HD-521

WILMOT-DANIELS HEAVY DENSITY SYSTEM

For Coal Cleaning and Ore Concentration

Send for **BULLETIN** *on this New Development in Heavy Media*



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Markle Bank Bldg., Hazleton, Pa.

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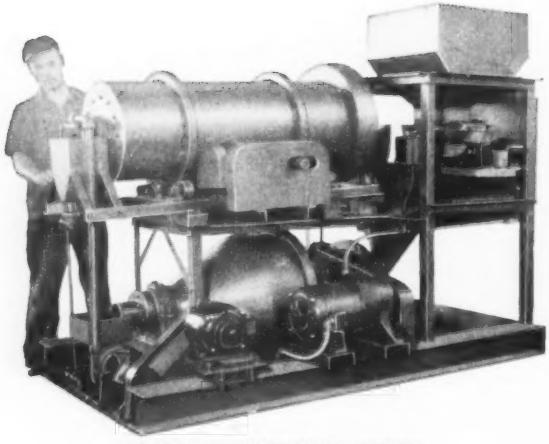
"PACKAGED PULVERIZERS"



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Write for Bulletin AH-373-1.

HARDINGE

This Month in Mining *(Continued)*

made by J. S. Carman and Pierre C. Delaitre, technical experts in the office of the special representative of the United Nations for technical aid at La Paz. Mutun is situated on the Brazilian border about 2,500 mi. up the Rio Plata system from Buenos Aires. The exposed section is about 9 mi. long by 3 mi. wide. Thickness of the formation is unknown.

Samples were taken along three lines, A, B and C, 2½ to 3 mi. long, cut southeastward across the formation about the same distance apart. Fifteen such samples taken along line A, starting at Fort Mutun, analyzed 55.65% iron, 11.57% silica, 1.29% manganese, 0.16% phosphorus and 0.51% sulphur. Fifteen samples along line B averaged 55.85% iron, 14.98% silica, 0.17% manganese, 0.07% phosphorus, and 0.10% sulphur. Along line C, eleven samples averaged 42.82% iron, 39.09% silica, 0.42% manganese, 0.15% phosphorus, and 0.03% sulphur. Four samples taken along a much shorter line, D, starting at Fort San Juan at the southwest corner of the area, averaged 49.7% iron, 22.51% silica, 0.18% manganese, 0.03% phosphorus and 0.17% sulphur.

A detailed examination of the Mutun area is advised by the engineers making this preliminary report.

American Metal Opposes Sliding-Scale Import Tax

SPEARHEADING the opposition to the sliding-scale import tax on lead and zinc, proposed at the last meeting of the Colorado Mining Association in Denver (See *E&MJ*, March, 1953, p. 126), the American Metal Co., of New York, issued a statement on April 21 condemning legislation embodying the tax.

Briefly, the sliding-scale tariff would add 1¢ per lb. duty on imported lead and zinc for each 1¢ the domestic price of those metals fell below a stated base level (15½¢). No additional tariff would apply if the U. S. price went above the base level.

"This bill (H. R. 4294)," the company stated, "at one legislative stroke would attempt to destroy the objectives of the Administration's publicly-stated foreign policy."

The American Metal statement pointed out U. S. dependence on imports of lead and zinc, which amounted to about 30% and 26%, respectively, of U. S. consumption in the years 1940 to 1952. Citing the origin of most of these imports in the Western Hemisphere, the company argued that defense needs were not a factor in keeping alive domestic mines at the expense of imports.

"The immediate purpose of the proponents of these tariffs is to increase the bill of the consuming industry of lead and zinc by about $200-million per annum on the basis of 12½¢ lead and 11¢ zinc. The majority of

the proponents of these higher tariffs are uneconomic high-cost mining companies, but the most articulate is a certain domestic producer which ranks high among the large and low-cost producers of the world. Thus these higher tariffs would serve the interests of the few at the expense of the many.

"The creation of these artificially high prices can only result in the encouragement of substitute materials for lead and zinc, thus injuring the long-range welfare of the lead and zinc mining, smelting, refining, and consuming industry, both here and abroad," the statement continued.

Employment loss is not a factor in the lead and zinc situation, the American Metal Co. contends, because of the relatively few men involved as compared with the extra cost to consumers of higher metal prices.

"The injury these tariffs would cause to the mining industry in friendly foreign countries with less highly developed economies may well be disastrous," the statement concluded.

IN THE U.S.A.

ALABAMA

★Mica mining operations in North Randolph and South Cleburne Counties are to start in the near future. Two years of exploratory work has located veins of mica 200 ft. below the surface and a shaft has been sunk 70 ft. so far. B. T. Sanders is supervising the shaft work near an old abandoned operation.

The deposit is about a mile south of Micaville, Cleburne County. Bourne Associates of Spruce Pine, N. C., are making the venture and were recently given a $16,000 government grant and an $18,000 grant to further explore mica deposits in the area.

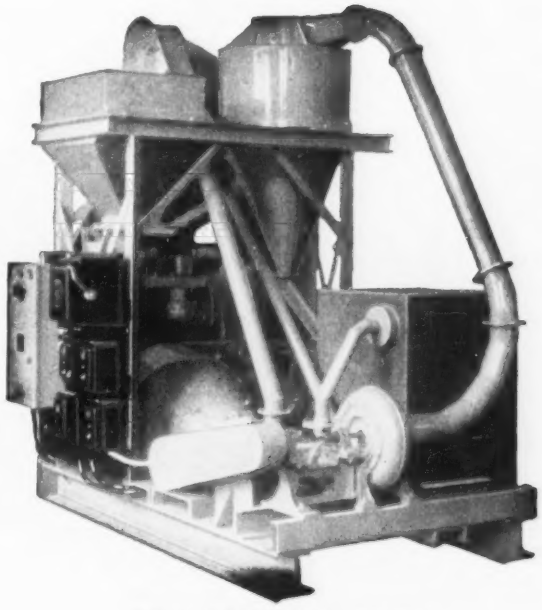
Geologists have stated that the veins are from 4 to 10 ft. thick.

ALASKA

★Kenai Chrome Co., which has recently secured funds from DMPA to mine the old Red Bank deposit near Seward, Alaska, and sell the ore to the government, is a partnership between Mile E. Seiler and John G. Bachner. It has been set up for the purposes of working the Red Bank project. DMPA spokesman says the agency was impressed by Seiler's long experience as a "practical sourdough operator" in Alaska and his "long string of successes" in difficult mining projects.

Seiler is the principal operator in Kenai; Bachner the financial partner. Seiler has managed a gold mine at Glacier Bay, Alaska, for 10 years. Previously, he operated hard-rock properties at Dome Creek near Fairbanks and placer mines.

"PACKAGED PULVERIZERS"



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63

ARIZONA

★San Manuel Copper Corp. and Magma Copper Corp. are negotiating a contract with Utah Construction Co. of San Francisco and the Stearns-Roger Manufacturing Co. of Denver, Colo., to design, engineer, and build a surface plant at the San Manuel copper development near Tiger, Ariz., in Pinal County 40 mi. northeast of Tucson. The contract will be for about $50 million.

Next step in development of the underground block-caving copper operation will be construction by the company of its own rail line from the town of Mammoth to some connecting point along the Southern Pacific line.

San Manuel's program calls for production in 1955. The entire development program will require $125-million, of which $94-million is being underwritten by RFC.

The $24-million townsite near Tiger being developed by the Del E. Webb Co. of Phoenix for housing and business activity of 7,000 people has been certified as critical by the Housing and Home Financing Agency.

★Opening of 20 small mines in Arizona since Jan. 1 has brought the total of operating mines in the state to 150, according to the Arizona Department of Minerals and Resources.

Of the new ones, 15 are manganese and 5 are asbestos properties. Mohave County in the northwest tip of Arizona leads the state in operating mines with a total of 31 now in production. Gila County is second with 25 and Yavapai third with 20.

★Value of the five principal metals produced in Arizona—copper, lead, zinc, gold and silver—since mining began in the state in 1860 passed the $5-billion mark in 1952—yet production figures for the year showed a significant decline.

The drops are attributed to a decline in recoverable copper, and the increase of production costs in other ores.

Copper production was down to 393,350 from 415,870 tons in 1951; the state dropped from sixth to seventh in lead production, and to sixth in zinc from a second-spot rating in 1949.

★Exploration work on the American Asbestos Co. developments in the Cherry Creek district near Globe indicate a workable orebody. In other asbestos activity, the Sorenson & Williams Mining Co. reports first work in stripping of an outcrop on properties of the Salt River district of the San Carlos Indian Reservation.

★A $75,000 lead-zinc exploration program for new silver orebodies in the Red Cloud Mine north of Yuma in Mohave County has been approved by the Defense Minerals Exploration Administration. Lloyd C. White, general manager of Yuma Metals Co., said principal work will consist of about 6,000 ft. of diamond drilling from the 500-ft. level in an effort to establish a sulphide zone underneath present

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol Vistac Oil

UNIT Rock drill-Ingersoll-Rand drifter

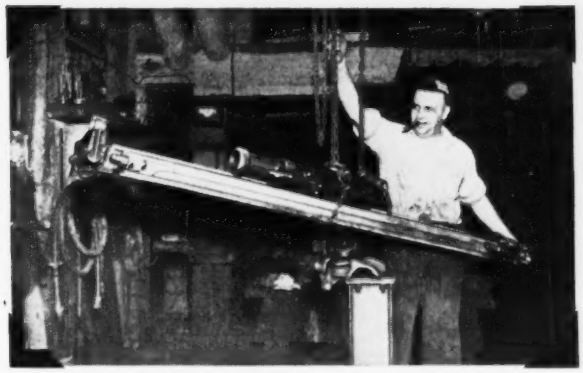
LUBRICATOR Line oiler

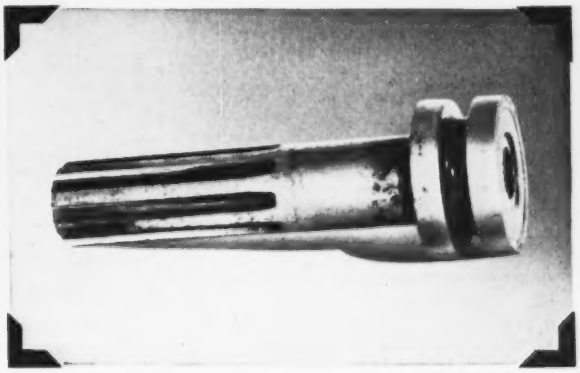
OPERATION Deep underground mining

CONDITIONS High humidity & temp

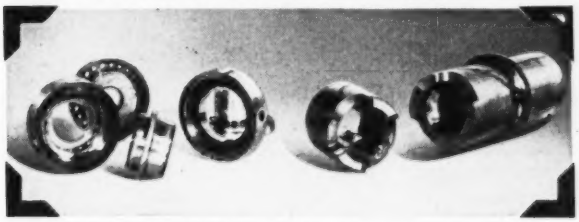
FIRM Sunshine Mining Co., Kellogg, Idaho

Only 0.001 wear on rock-drill piston in 120 shifts!





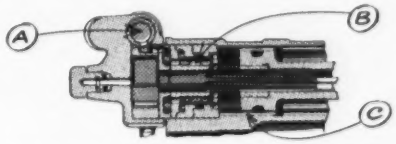
ON THE 3100-FOOT LEVEL of the famous Sunshine silver mine, this drifter, lubricated with Calol Vistac Oil, was in steady service for more than two months before coming in for service. When disassembled by "Drill Doctor" Dave Farnsworth, the piston "miked" only 0.001 inch wear despite the tough conditions in which the drill works. Working face is 400 feet below sea-level. Humidity is around 90 with atmosphere at a constant 75°F. After cleaning, the piston and other parts were put back in service.



VALVE-CHEST ASSEMBLY, chuck and chuck jaw from the drifter. Note the absence of lacquer or corrosion on air-valve parts. Because Calol Vistac Oil has held air-tool wear to the minimum and is approved by the miners, Sunshine Mining Co. has used it for more than 10 years.

REMARKS: Besides providing good air-tool lubrication without excessive vapor or bad odor, Calol Vistac Oil is excellent for heavy-duty plain bearings, reduction gears, motor gear heads, etc. It comes in several grades and may be applied by wick-, ring-, and drip-feed oilers.

How CALOL Vistac Oil cuts costs in air-tool equipment



A. Atomizes quickly and completely—carries evenly over all parts. Does not fog excessively and has no unpleasant odor.

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1. Orinoco Mining Company's new ore and cargo handling dock on the Orinoco River, Venezuela. Composed of 3 units, this DeLong dock is 1,130 ft. long, 82 ft. wide, and 15 ft. deep.

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Field work is practically eliminated in dock construction, due to the development of the patented DeLong Airjack. This new technique of dock construction speeds installation, cuts costs.

The DeLong Airjacks, which are the key to the whole transformation of barge to pier, enable the dock to "climb" the steel columns, or caissons, to required elevation. After the self-lifting operation, caissons are driven to refusal for permanent installations. Caissons are welded to deck and cut off flush; then filled with concrete or sand and tops closed with welded cover plate.

More than ½ million sq. ft. of the DeLong type of pier are in use or under construction in diversified locations that range from the Arctic to South America.

The DeLong Airjack can cut time and costs in the construction of offshore oil well drilling platforms, portable and permanent piers, and many other types of installations. A DeLong dock can be erected and, after having served its purpose, jacked back to water level and towed to a new location.

2. A week after arrival at Orinoco River site, first dock section 376 ft. long berths ship, and unloading begins. Two additional units make this pier 1,130 ft. long.

3. Loaded dock section, fabricated at an Orange, Texas yard, arriving at site on Orinoco River, after being towed across 3,000 miles of ocean. Dock carried caissons, crane, Airjacks, compressors, generators, other installation gear.

4. Crane placing 6 ft. diam., 100 ft. long steel caissons in wells fitted with Airjacks. Crane, Airjacks and other equipment were later transferred to second and third sections for erection purposes.

5. Caissons held in position by Airjacks until dock barge is jockeyed into final position. Caissons are then dropped to river bottom and DeLong Airjacks lift dock to final elevation. Control is so precise, height of dock can be regulated to 1/32 of an inch.

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Arizona *(Continued)*

workings. Since 1949 the company has acquired 39 mining claims in the district and plans a 15-month development program that will include 1,650 ft. of drifting, 8,000 ft. of surface drilling, and installation of a 100-ton flotation mill.

The mill is designed for recovery of gold, silver, lead, and zinc. As planned 91% of the zinc will be depressed and stored, with the other three metals extracted first.

CALIFORNIA

★A new zinc fuming plant will start operating this month at the American Smelting and Refining Co. plant at Selby, Calif. Plant Manager W. S. Reid says the new unit is expected to produce 800 tons of zinc a month in the form of zinc oxide. According to Reid, the plant was built after preliminary investigation at Selby showed that efficient recovery of zinc metal was possible from a 10% zinc slab produced in the lead smelter.

★Idaho-Maryland Mines Corp. reports an operating loss for 1952 of $59,000 before depletion and depreciation charges. Main factors in the loss, say company officials, are wage increases for miners and a manpower shortage during the summer months. The company is milling about 11,500 tons of ore monthly, in sharp contrast to the pre-World War II output of 1,000 tons a day.

★In Grass Valley and Nevada City, Calif., the 300 miners of the Mine Workers Protective League rejected a proposal to affiliate with the CIO United Steelworkers Union.

★A chromite concentrator that can treat 100 tons of ore per day has been installed 6 mi. south of San Jose, Calif., by the Palo Alto Mining Co. The company announced it will buy ore grading as low as 25% chromic oxide. The plant is treating ore from three nearby properties.

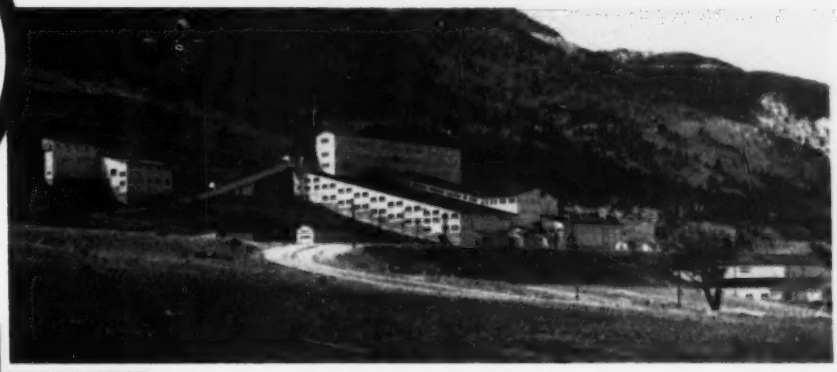
★**Chrome ore is now being mined** at the Castro Chrome property about 8 mi. north of San Luis Obispo, under lease to Durand A. Hall, San Francisco mining engineer and one of the owners and former general partner in charge of operations of Castro Chrome Associates. George I. Barnett, San Francisco, mining engineer, is associated with Hall and manager of the operation.

Castro ore is being mined from open cuts after stripping, and delivered to the 150-mill owned by International Metallurgical Chrome Corp., 4 mi. north of the Castro property. Castro concentrates will be shipped to the government stockpile at Grants Pass, Ore.

Construction of a road between the property and the mill, stripping, mining, loading and hauling to the mill are under contract to the Madonna

NEW CAPACITY FOR CRITICAL CHROME

WKE



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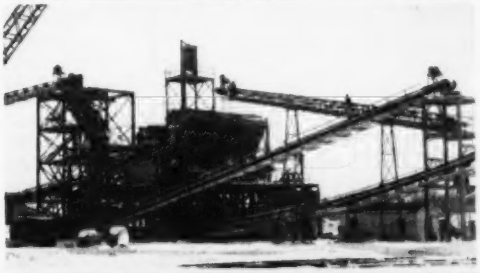

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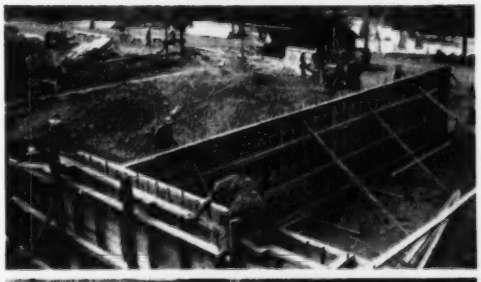

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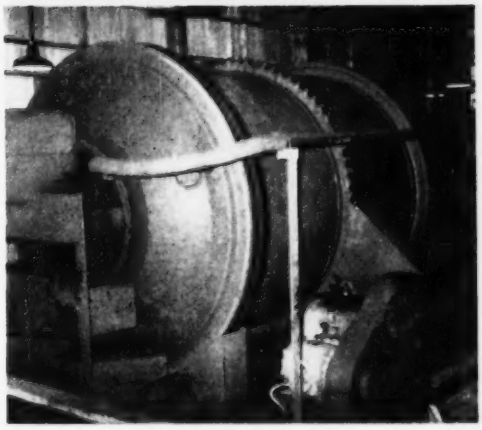

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Now nearing completion by Western Knapp Engineering Company is this chrome concentrator being restored for the American Chrome Company. Located near Columbus, Montana, this plant will have a capacity of 1,000 TPD employing gravity concentration for treatment of ore. When the decision was made to reactivate this plant WKE was assigned responsibility for the detailing, construction and equipping of this vital addition to America's industrial strength.

The specialized skills and practical know-how required by this project illustrate again the ability and experience offered by WKE to clients in the mineral dressing field, both metallic and non-metallic.

If you are contemplating plant design and construction, or expansion of present facilities, write for full information about WKE services.

● *Among other current WKE projects:*

FLUORSPAR **1** **KAISER ALUMINUM & CHEMICAL CORP.,** Fallon, Nevada. Engineering and equipment procurement service was furnished by WKE for this 100 TPD fluorspar flotation plant recently placed in operation.

IRON **2** **COONS-PACIFIC CO.,** Eveleth, Minnesota. 300 TPH iron washing plant recently completed with participation by WKE in design and construction. Equipment includes Heavy Media Wemco Mobil-Mill, other gravity concentration units and auxiliary washing equipment.

LEAD-ZINC SULPHIDE **3** **CANADIAN EXPLORATION, LTD.,** Salmo, British Columbia. Now in progress, project calls for expanding capacity from 850 to 2,000 TPD in a lead-zinc sulphide selective flotation plant. Design, constryctjon and material procurement by WKE.

COAL **4** **WISE COAL & COKE CO.,** Dorchester, Virginia. A 160 TPH Heavy Media Separation plant for coal washing. Design and construction by WKE. Plant includes Wemco Mobil-Mill with Two-Compartment Drum Separator (see photo).

W.K.E.

WESTERN KNAPP ENGINEERING CO.

DIVISION OF WESTERN MACHINERY COMPANY

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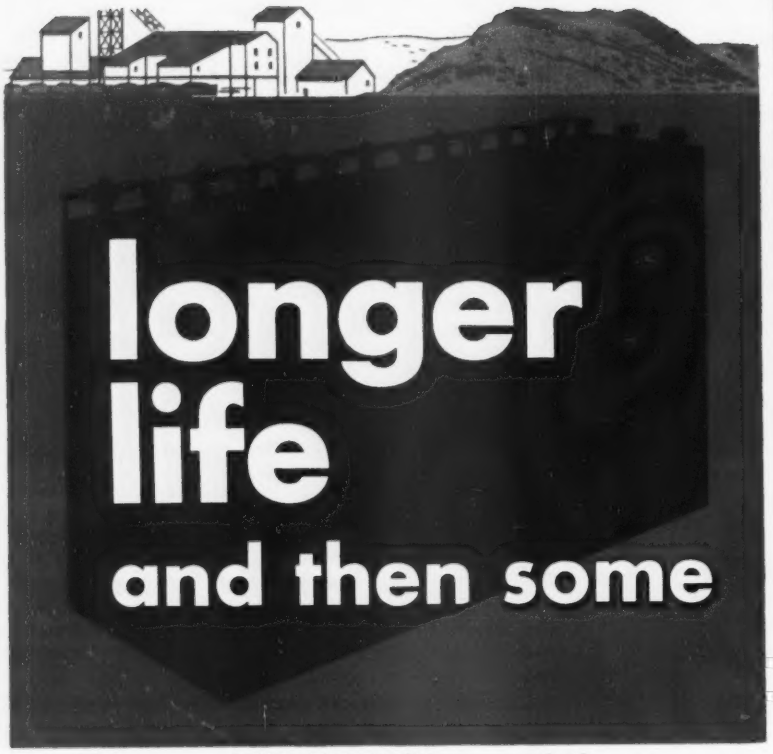


with an EDISON steel battery

extra long life ... Many users report that EDISON batteries compared to other types average 2 to 3 times longer life supplying dependable power to mine locomotives. Many mines obtain a second life by shifting them to standby uses, operating circuit breakers, mine signals, emergency lights.

doubly dependable ... With steel cell construction and an electrolyte which is an actual preservative of steel, the EDISON battery is built to stand mechanical abuse. In addition, it's tough electrically ... unharmed by accidental short-circuiting, reverse charging or indefinite storage caused by shutdowns.

greater over-all economy ... That longer EDISON life in terms of lower depreciation cost, less downtime and less maintenance adds up to a battery that will give you the greatest dependability and the lowest over-all cost.

It will pay you to write today for Bulletin S.B. 3826 and the address of your nearest Edison field engineer. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.

Most Dependable Power —Lowest Over-all Cost ... you get both with an EDISON

EDISON
Nickel · Iron · Alkaline
STORAGE BATTERIES

California *(Continued)*

Construction Co., of San Luis Obispo. Hall plans to explore the property to extend ore reserves, and negotiations are now under way with the DMPA for a term contract for an annual tonnage larger than the 5,000 long tons of concentrates from a single property now limited by the Grants Pass government stockpile regulations.

The property is owned by former members of the Castro Chrome Associates, San Francisco, who operated the property from 1942-46, producing some 27,000 long tons of concentrates during World War II. Ore was then treated in a 120-ton plant at Gold Tree Siding about 6 mi. from the mine. At the end of the war government contracts expired and the mill was dismantled and sold. Substantial reserves of high grade concentrating ore had been developed but had not been stripped.

COLORADO

★Cripple Creek Mining and Milling Co. has opened up a good stope of ore on the 10th level of the Gold King. Supt. Richard Walls reports the 2 to 4 ft. vein has been drifted on for about 50 ft. Now a raise has been run up in the ore shoot for approximately 40 ft. with good values continuing. A large lot of screenings and a lot of coarse ore are being hauled to the Golden Cycle mill. The screenings settle for about an ounce of gold per ton. Some of the samples of the rich streak in the vein have assayed as high as 20 oz.

★Gold and silver receipts at the Denver mint in February were up slightly above 1952 levels. Receipts of gold were up to 51,814 oz. worth $1,813,523 this year, from 51,616 oz. worth $1,806,575 in February, 1952. Silver receipts rose to 186,173 oz. worth $168,437 from 182,798 oz. worth $165,408. Number of shipments was off slightly to 285 from 291.

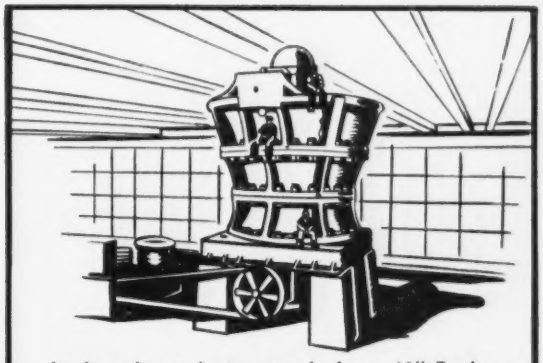
★Golden Cycle Corp. directors have declared a dividend of 15¢ a share, payable March 31, record date March 20. This is the first dividend since 1944. Merrill E. Shoup of Colorado Springs, president of Golden Cycle, said the declaration established dividends on a quarterly basis. He said results for 1952 were substantially better that for 1951. The labor situation in the Cripple Creek-Victor area has been greatly improved by the influx of miners from closed lead and zinc mines in the San Juan area.

★Alexander Film Co. has sold the perlite mill at Florence, and the Alexite mine at Rosita, to Great Lakes Carbon Corp.

★One of the highlights at the recent convention in Denver was the presentation to Charles A. Chase, general manager of the Shenandoah-Dives Mining Co., the safety award for 1952.

(Continued on page 148)

Ten Years of hard labor



Look at the production record of one 60" Traylor Bulldog Gyratory Crusher installed in 1942. This is a record of 10 years of hard labor.

Now over 10 years old, this Traylor TC is producing 3984 tons per hour of 6" ore. To date, it has crushed 119 MILLION TONS of ore.

Your slide rule will tell you this Traylor crusher had to work an average of over 8 hours a day, 7 days a week, 52 weeks a year, for 10 consecutive years to make this record . . . which is exactly what it did.

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Production records like this have been set by Traylor TC Gyratory Crushers all over the world. They will set new production records for you, too. For complete details of exclusive design features that enable a Traylor to increase your production . . . at a profit . . . send for your copy of Bulletin 126.

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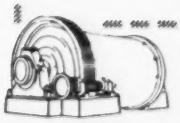
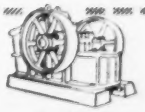
Rotary Kilns

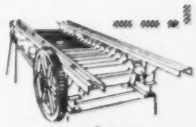
Secondary Gyratory Crushers



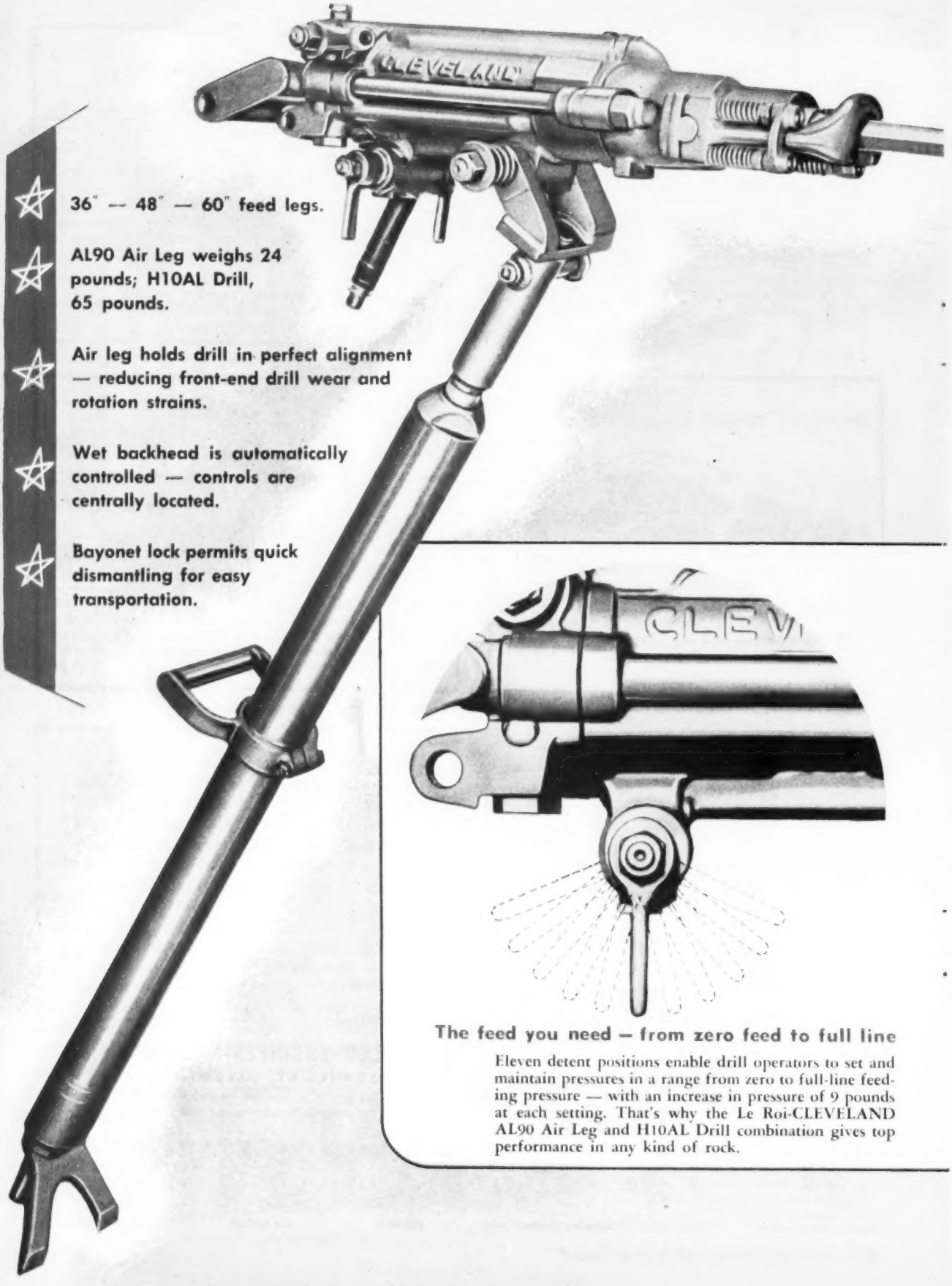
Ball Mills



Jaw Crushers



Apron Feeders



- 36" — 48" — 60" feed legs.
- AL90 Air Leg weighs 24 pounds; H10AL Drill, 65 pounds.
- Air leg holds drill in perfect alignment — reducing front-end drill wear and rotation strains.
- Wet backhead is automatically controlled — controls are centrally located.
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The feed you need — from zero feed to full line

Eleven detent positions enable drill operators to set and maintain pressures in a range from zero to full-line feeding pressure — with an increase in pressure of 9 pounds at each setting. That's why the Le Roi-CLEVELAND AL90 Air Leg and H10AL Drill combination gives top performance in any kind of rock.

You're ahead 3 ways:

☆1. Easier Drilling

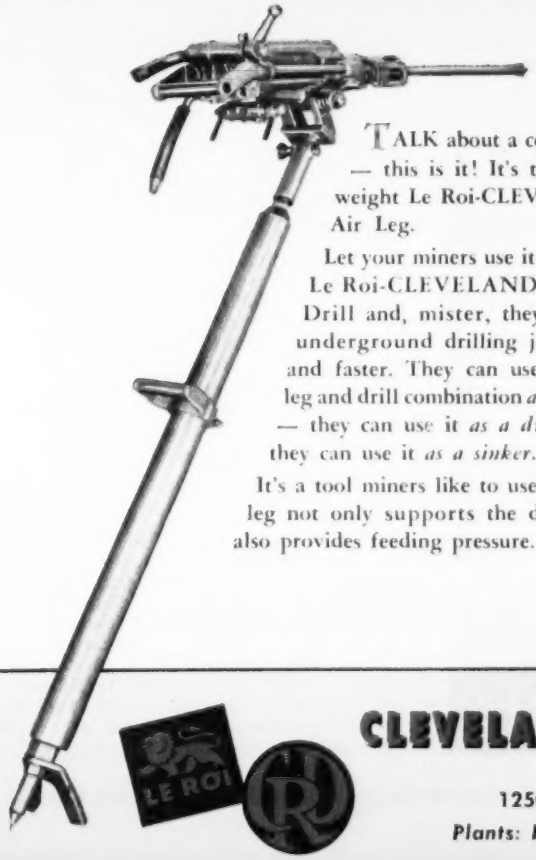
☆2. Greater Footage

☆3. Lower Costs

— with LeRoi-CLEVELAND

AL90 Air Leg and H10AL Drill

and exclusive feed control!



TALK about a cost-cutter — this is it! It's the lightweight Le Roi-CLEVELAND Air Leg.

Let your miners use it with the Le Roi-CLEVELAND H10AL Drill and, mister, they do any underground drilling job easier and faster. They can use this air leg and drill combination *as a stoper* — they can use it *as a drifter* — they can use it *as a sinker.*

It's a tool miners like to use. The air leg not only supports the drill, but also provides feeding pressure. And the leg absorbs any recoil. Miners' work is easier; they are less tired at end of the shift.

But that's not all! The feed control is built in — eliminates the necessity for a third hose and cumbersome "Y" connections. There's no feed-control bleed valve — the operator does not have to continually bleed-off air, to maintain suitable feeding pressure. He can change or advance the position of the leg easily and quickly.

Increase your footage — lower your drilling costs — ease the load on your men. Put the versatile Le Roi-CLEVELAND AL90 Air Leg and H10AL Drill to work for you. Write today for complete information.

RD-51

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HERCULES Red-Strand earns it
Why do these men, among others, praise Red-Strand so highly? In a few words, it's because higher-than-rated quality in Red-Strand wire rope means longer-than-expected service . . . year in, year out.
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In business only to make wire rope . . . better wire rope . . . since 1857
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Colorado *(Continued)*

The award was given to the Silverton mine by the Industrial Commission of Colorado and signifies that the company had fewer accidents than any mine in the state for the past year. There were no major accidents during the period.

★The Shenandoah-Dives property at Silverton has stopped production due to low lead and zinc prices. A development and exploration crew will continue work. It is planned to drive a tunnel with a crew of 50 men into the adjoining Silver Lake property.

★A new ore shoot has been cut on the 3rd level of the Deadwood Mine at Cripple Creek, by Lloyd Stoner, one of the lessees. The Deadwood mine is on Bull Hill and has produced $1,865,000 in gold. The shaft is on United Gold Mines ground.

★After examination by government engineers, the Golconda mine owned by J. Henry De Linde of Idaho Springs is in operation with a crew of four men. The mine is located up Fall River, Clear Creek County, and is being worked under a government contract.

★The Annabelle tungsten mine where Leroy Osgood of Gunnison is superintendent for the Lilly Belle Mining Co., reports that tungsten prospects look "very good" and expansion of the operation on to three adjoining claims is planned for the spring. The shaft is only about 25 ft. deep at present.

IDAHO

★Gibbonsville Mining and Exploration Co. has put into operation its new 400-ton concentrator plant on the south fork of the Coeur d'Alene River west of Kellogg, after a brief delay because of winter conditions. The new plant, built with the aid of an RFC loan, will process lead and zinc tailings which washed down the river from early-day milling operations in the Wallace-Burke area and were deposited in the river bottom. Estimates place the value of lead, zinc and silver in the tailings at $2,500,000. Ernest E. Eddy, Spokane engineer, supervised construction of the mill and is in charge of its operation.

★Bunker Hill & Sullivan Mining and Concentrating Co., largest operation in the Coeur d'Alene mining district, has concluded a contract with DMEA under which the latter agency will pay half the cost of an exploration project at the Bunker Hill's Crescent mine on Big Creek, which, it is estimated, will run over a million dollars. The project involves unwatering and rehabilitating old workings which have been closed down for more than 10 years, deepening the shaft from the 1200 to the 3200-ft. level, and carrying out extensive exploration work on the new lower horizon. Work on the project was started in March.

SWITCH TO GM DIESEL

GM Diesel-powered 1½-yard dragline stripping overburden at Indiana coal mine

FOR MORE WORK AT LOWER COST

Today you can have the extra economy, efficiency and dependability of General Motors Diesel power on *any* job from 16 horsepower up.

This faster-working 2-cycle Diesel is available, for example, as original power in 94 sizes and models of excavators (½-yd. to 4½-yd. capacity) built by 21 different manufacturers.

Two-cycle operation means you get more power from a smaller engine — a Diesel that fits where many others won't. It's smoother, quicker-acting, faster-starting power that "hangs on" to a load and gets more work done on fewer gallons of low-cost fuel.

Clean, simple design makes maintenance easy and economical. Most moving parts are identical for all GM Series 71 engines—2 to 24 cylinders. This feature of interchangeability means parts cost you less and you can protect a whole fleet with a small stock of spares. What's more, you need never worry about replacements or service, for GM Diesel engines and parts are sold through a world-wide organization of distributors and dealers. There is one near you.

These are solid reasons why you find GM Diesel engines so widely used in everything from air compressors to giant shovels, and available as original or replacement power in more than 750 different models of equipment. Your nearest GM Diesel distributor will gladly show you in dollars and cents why *it will pay you to standardize on General Motors Diesel power.*

GM GENERAL MOTORS DIESEL POWER

DETROIT DIESEL
ENGINE DIVISION
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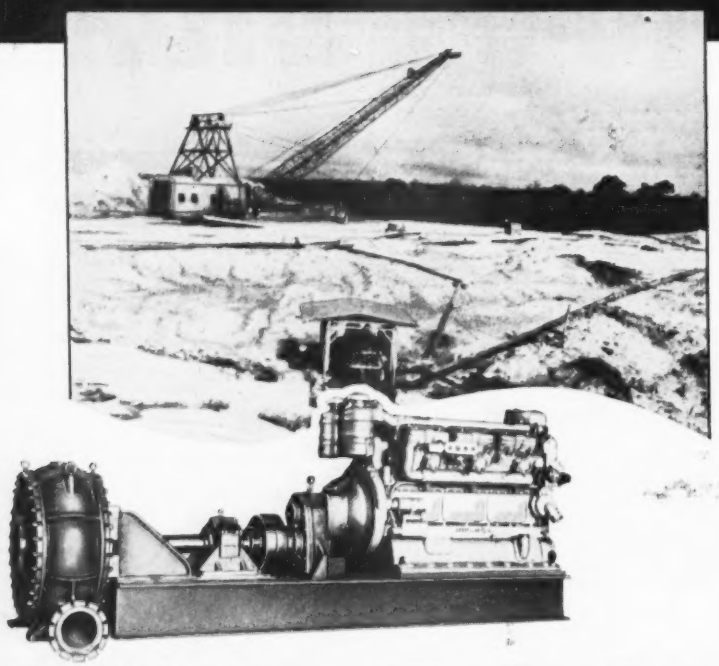
Single Engines . . . 16 to 275 H.P. Multiple Units . . . Up to 840 H.P.

Here's the most efficient dredge pump ever built . . . mining bauxite in British Guiana



MORRIS Type G Dredge Pump

"Delivers more material—in a shorter time—at lower cost." This is the one comment we consistently receive from all over the world on the Morris Type G Dredge Pump.

What makes the Type G so efficient is its design and construction—the end result of 89 years' experience in specialized pump manufacture. The patented impeller design balances casing pressure—eliminates points of unusual wear. All parts wear evenly, last far longer. Critical sections of the casing are considerably thickened to greatly increase casing life. Specially designed bearings stand up under the severest kinds of hydraulic or mechanical loads.

Because of its special bearings, the Type G can run at considerably higher speeds than normally expected of dredge pumps—and can be direct-connected to high speed Diesel engines. For example, at the Demerera Bauxite Company of British Guiana the Morris Type G shown above is driven by a Caterpillar D-386 engine through a Cotta 2 : 1 reduction gear.

Speed—output—economy . . . you get all 3 with a Morris Type G. Let our engineers help you select the right pump size for your particular needs. No charge or obligation.

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
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MORRIS *Centrifugal Pumps*

Idaho *(Continued)*

Earlier rehabilitation work by the company in the main adit tunnel resulted in the discovery of radioactive ore near the shaft station. Assays revealed that a narrow streak of ore contained ½% uranium in the form of pitchblende, a commercial grade of ore under favorable mining and milling conditions. Development of the showing will be undertaken when lower workings have been unwatered and reopened.

★Annual reports for 1952 by mining operations in the Coeur d'Alene district, almost without exception, show a sharp decline in earnings due to the precipitous drop in lead and zinc prices during the latter part of that year. Profits of all the larger operations—Bunker Hill, Federal Mining and Smelting, Hecla, Sunshine, Day Mines and Polaris—were substantially lower and for most smaller companies the squeeze between low metal prices and high production costs was even greater.

★Irvin C. Porter has purchased the Buffalo mine on Agency Creek in Lemhi County, about 32 mi. southeast of Salmon, from G. Elmo Shoup and Earl Pyeatt, and has also purchased the lease which G. W. Burkman of Idaho Falls had on the property. An extensive program of construction and development is planned. The six-claim group contains radioactive mineralization along with copper, silver and gold values.

★Highland - Surprise Consolidated Mining Co. has completed deepening its shaft in the Pine Creek area to the 1950 level and is now establishing two new mine levels on the 1650 and 1850 horizons. The work is being carried on under a DMEA contract. Preliminary diamond drilling indicated that the shaft-work was justified.

★Down-hole diamond drilling at Signal Mining Co.'s Hilarity property in the Pine Creek area, the initial phase of a DMEA program now in progress, has shown sufficiently satisfactory results to warrant deepening the shaft and opening new levels on the 350 and 500-ft. points.

★Silver ore of commercial width and grade had been opened over a strike length of about 500 ft. at American Smelting and Refining company's Vulcan project west of Wallace. A west drift had not yet reached the limit of the ore shoot, but on the east end it had been terminated by a fault. Development ore averages 35 to 40 oz. of silver per ton.

★J. R. Davies & Son, Gooding, Idaho, mine operators and contractors, have purchased the Croesus patented mining claim in Camas County northeast of Fairfield and plan to work it in conjunction with the nearby Butter Cup claim which they bought last year.

(Continued on page 157)

Wire Rope at Work—As you draw near New York City at the northern end of the 118-mile New Jersey Turnpike, this is the bridge that carries you high above the Passaic River. The picture, taken at a time when the bridge was near completion, shows two 146-ton girders for the main span being lifted simultaneously into place by Bethlehem Wire Rope.

These heavy steel girders made a tough lift, but no tougher than thousands of others entrusted to Bethlehem rope all over the country. Wherever there are heavy lifting or hauling jobs to be done, you will find Bethlehem rope right in the thick of things, hard at work. You will always know it by the black-and-yellow reel, the reel that tells you, "Here a good product is in service."

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:
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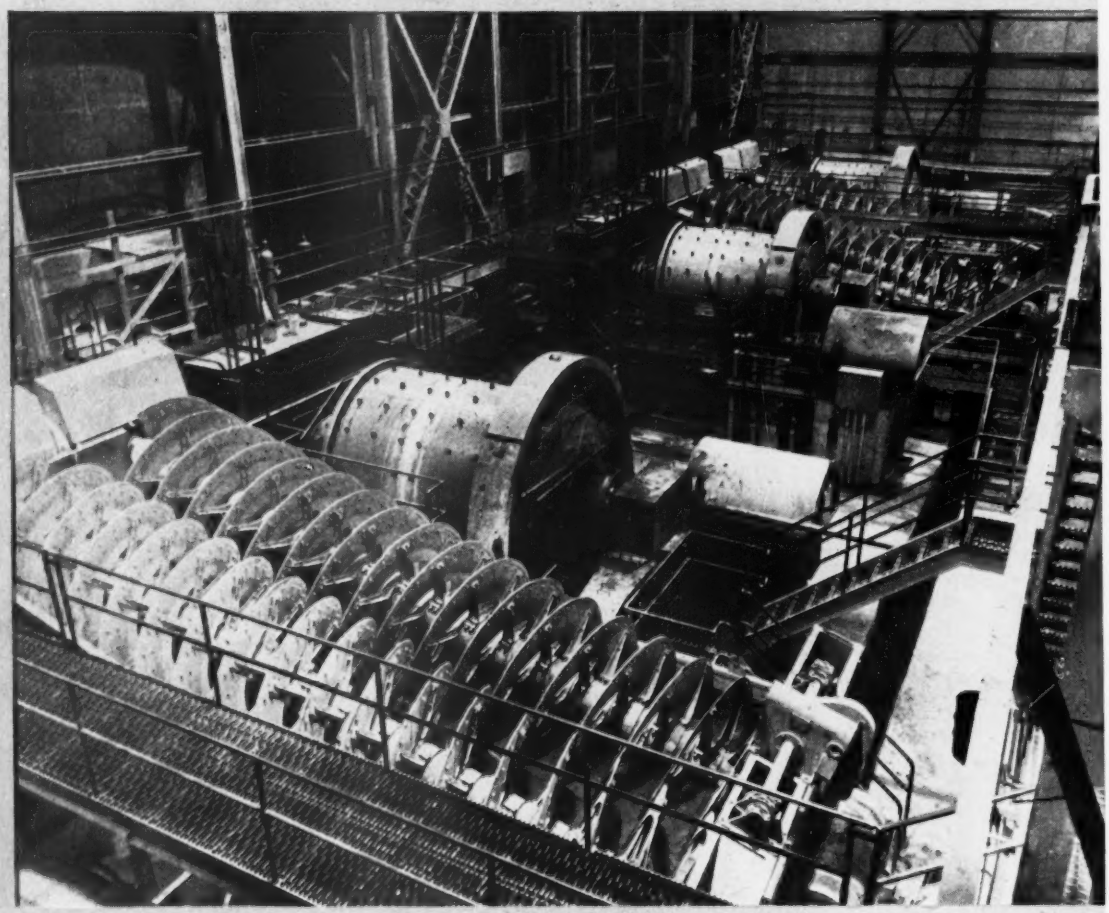
ANOTHER REPEAT ORDER



3—9'x9' Marcy Grate Discharge Ball Mills and 3—78" Akins Duplex Classifiers recently installed in new mill at Climax. A duplicate grinding section has been ordered for another addition to the new mill.

FOR JOB-PROVED PERFORMANCE INVESTIGATE MARCY MILLS AND AKINS CLASSIFIERS

FROM CLIMAX

FOR COST-CUTTING TEAM OF MARCYS & AKINS

3 more No. 99 Marcys and 3—78" Duplex Akins for new section.

Since 1929 The Climax Molybdenum Co. has placed 11 orders for Marcy Mills and Akins Classifiers—convincing evidence of dependable, cost-cutting mechanical and metallurgical performance. Equipment ordered includes the following:

VIEW OF THE NEW MILL AT CLIMAX

MARCY MILLS	AKINS CLASSIFIERS
2 — 5' x 20' pebble mills	15 — 78" duplex
4 — 8' x 20' pebble mills	1 — 78" simplex
1 — 9' x 7' ball mill	1 — 60" duplex
12 — 9' x 9' ball mills	5 — 48" duplex
	1 — 45" simplex
	1 — 12" simplex

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AND ITS SUBSIDIARY COMPANY

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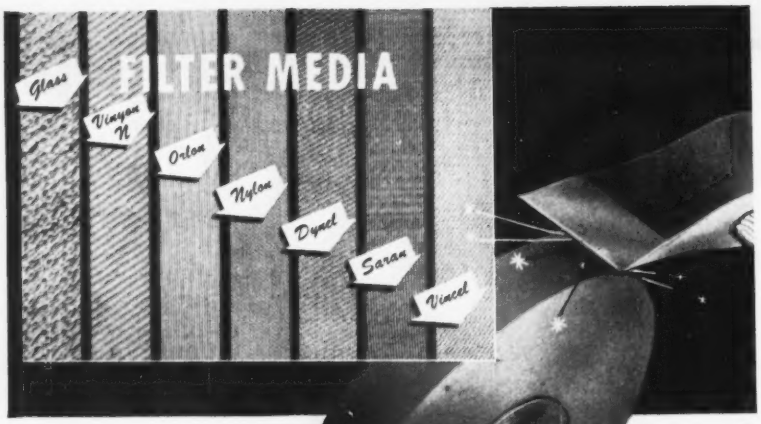

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***T.M.—Reg. U.S. Pat. Off.

As manufacturers of an extensive line of Filter Cloths our analysis of and recommendations for your filter cloth problems will be unbiased...we have "no ax to grind" regarding any particular cloth.

Each of the cloths listed above offers different operating advantages. Each type has its own range of chemical resistance, its own temperature limits and its own degree of resistance to moisture, molds, fungi and bacteria. With such a variety we are in position to recommend a filter cloth that will give you the best service for your particular application.

In writing for literature and test samples please tell us about your problem.

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Johannesburg, South Africa Edward L. Bateman

Idaho *(Continued)*

The firm has a milling plant in the vicinity and last year treated about 500 tons of Butter Cup dump material with good results.

★Lack of deliveries of zinc concentrates forced Sullivan Mining Co. to close down one unit of its electrolytic zinc plant near Kellogg on April 1. The unit represents about 25% of the plant's capacity and shutting it down will mean the loss of about 15,000 tons of finished metal on an annual basis.

★U. S. production of radioactive monazite sands and their rare earth derivatives suffered a severe setback when a 600-ton bucket-type dredge of the Warren Dredging Co. overturned and sank in its pond near Cascade, Idaho.

A. Fred Baumhoff, a partner in the company with J. R. Simplot of Boise, said the dredge produced about one-third of the nation's monazite. The sands, which contain about 5% thorium, were being dredged for the Atomic Energy Commission and by-products resulting from electro-magnetic separation—ilmenite, garnets, and zircons—were being sold through commercial outlets.

The dredge, one of three operating in the Big Creek section of Long Valley, overturned and sank in 33 ft. of water when a sand pump failed and a pontoon filled with water. Three men operating the dredge escaped injury. The dredge sank in about 10 minutes.

Mr. Baumhoff estimated the loss at nearly $500,000. After the dredge pond is pumped out, salvage operations will be started. Baumhoff said the dredge cannot be righted and only parts which can be dismantled will be saved.

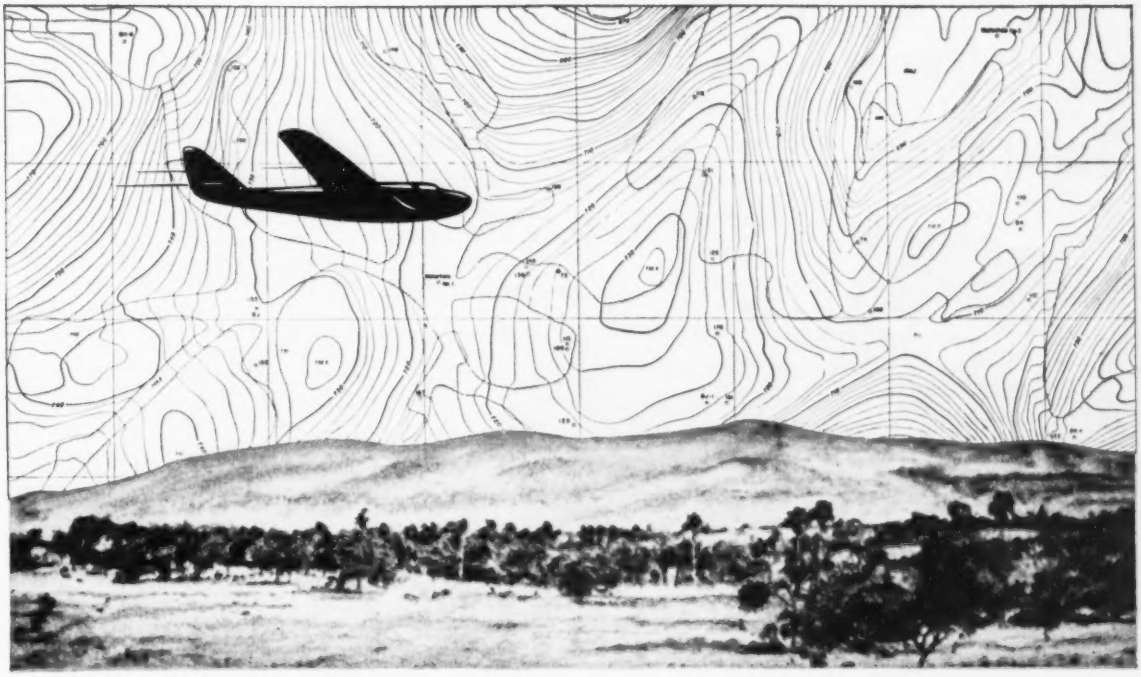
MICHIGAN

★**The first truck load** of ore to be taken out of the new White Pine mine of the Copper Range Co. in Ontonagon County came to surface March 31. It was brought out by Bernard Chaput, a miner. Blasting had taken place earlier in the day and on the previous day. Fifty or more workers and others witnessed the historic happening. There was little fanfare. First the loading tractor appeared. Then up came the load of reddish rock.

C. F. Haberlen, mining engineer, supervised the work of getting out this ore. The blasting was in charge of Edward Murray, an explosives engineer of Atlas Powder Co., and E. H. Quick, an explosives engineer of Chicago. They supervised the blasting on both days.

The White Pine project is described at length in *E&MJ* for January, 1953.

★Ore from Pickands Mather's Anvil-Palms mine is being hoisted through the old Euclid shaft of Oglebay, Norton & Co., mining having been completed at the Euclid.



MAPS FOR CERRO BOLIVAR

Speed Engineering Planning and Development

Few present day mining developments can match *Cerro Bolivar*, in Venezuela.

Now AERO has delivered complete, detailed contour maps and precise aerial mosaics of this ore body and its environs. We covered an area of 20 sq. kilometers on 40 map sheets at a 1:1000 scale with 2 meter contour intervals. The maps will speed the entire development by aiding the location and designing of railroads and access roads for the movement of equipment and ore . . . and by furnishing other valuable planning data.

So AERO surveys are paying off two ways. They are helping to uncover important new finds of iron, chrome, titanium and other minerals in many parts of the world. And with precise, complete engineering maps, these projects are being advanced by months and even years.

On large scale projects or small, the cost of AERO mapping is but a fraction of slow ground survey methods. Our engineers can bring a wealth of experience to your conference table. It will pay you to consult AERO, pioneer and leader in aerial mapping.

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PRECISE AERIAL MOSAICS
TOPOGRAPHIC MAPS
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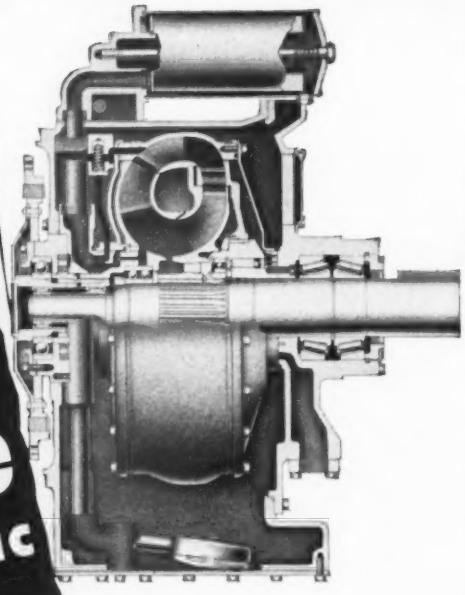

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Typical Twin Disc Two-Stage Hydraulic Torque Converter, Model SD (shown above), with Spider Drive and Disconnecting feature.

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Michigan *(Continued)*

★Peter Kiewit & Son are stripping the Pickands Mather's Fortune Lake mine in the Iron River district.

★Although the Montreal mine has averaged well over the million-ton mark in the last six years, it fell slightly below the figure in 1952.

★Of the three "old ranges" of Michigan in 1952, the Marquette shipped 4,525,660 tons, of which 285,422 tons went all-rail; the Menominee produced 4,344,619 tons, sending 489,219 tons all-rail; and the Gogebic 4,173,665 tons, of which 24,786 tons went by rail.

★Operations at Cleveland-Cliffs' Mather "A" mine were recently suspended for two weeks during which the shaft was sunk to a new level.

★Reduction of $495,000 in the assessed valuation of iron mining properties in Gogebic County for 1953 has been recommended by the Michigan state appraiser of mines. This would reduce the total valuation to $18,535,000.

★The new shaft at Pickands Mather's Peterson mine on the Gogebic Range is down to 2,600 ft. On May 12, 1952, it was 1,211 ft. deep.

★M. A. Hanna Co. has added about 40 employees in recent weeks in the Iron River district to increase its working forges at the mines and to man the new Cannon shaft development. The company is the largest mining employer on the Menominee Range, with about 800 men.

★Ore loading for the 1953 season in the Iron River district began on March 23 at the Sherwood, Bristol and Tobin mines. The ore went to the docks at Escanaba where the first ore boat arrived on March 29. Ice 18 to 20 in. thick which extended 6 mi. into Bay de Noc, was broken up by the ice breaker "Mackinaw."

★A net increase of $890,000 has been recommended in mine valuations for taxation purposes in Iron County, Mich., for 1953 by H. J. Hardenberg, Michigan deputy state geologist, bringing the total valuation of mineral property in the county to $26,831,000. Among the larger increases were the following: Spies-Virgil (Cleveland-Cliffs) from $255,000 to $435,000; the Cannon (M. A. Hanna) from $205,000 to $525,000 and the Sherwood (Inland Steel) from $4,500,000 to $4,725,000. The Wauseca (M. A. Hanna) was increased $215,000. There were some decreases in valuation: Davidson Nos. 1, 2 and 3 dropped from $940,000 to $410,000; the Spies from $255,000 to $100,000. The increases, however, were sufficient to make a sizable net gain.

★At Jones & Laughlin's Tracy mine on the Marquette Range in Michigan shaft-sinking has been completed at 1,568 ft. The shaft is 18½ x 13 ft. in cross section and the headframe 153 ft. high. The skips hold 15 tons and can be hoisted at 2,300 fpm. Production is expected to begin in 1954.

MINNESOTA

★Construction work on M. A. Hanna's new Patrick "C" plant is well advanced and the stockpile conveyor system has been completed. Crews have been working six days per week on the Carlz screening and washing plant; construction of the Morton ore-hoisting system continues, also of the shipping pocket and conveyor system at the Enterprise, and the cyclone addition to the Harrison plant. New trucks have been delivered at the Carlz and the Cooley group mines.

Winter stripping has been carried on at M. A. Hanna's Cuyuna Range mines. Surface has been moved at the Huntington, Louise, Snowshoe and South Hillcrest, with some rock stripping also at the latter two mines. Some rock was stripped at the Portsmouth mine and the pit drainage shaft has been deepened.

The Hanna Co.'s Mesabi Range mines have also been busy. Surface stripping has been pushed at the Buckeye, Patrick "C," Harrison, Carlz, Morton, South Agnew, Douglas and Enterprise mines. The Section 18, the Mississippi group, Perry and Weggum have handled rock.

★Ore loading at the mines of the Hibbing-Chisholm district of U. S. Steel's Oliver Iron Mining Division began on March 27 and at six Oliver mines in the eastern Mesabi district. The Coast Guard cutter "Woodrush" broke up the ice in the Duluth-Superior harbor and the first ore boat arrived there on March 31. It was the "Pargny," of the Pittsburgh Steamship Co. fleet, which left the harbor at 10.05 am with the first load of ore from Superior for the 1953 season. The first ore boat to arrive at the head of the lakes was the "Benjamin F. Fairless," also of the Pittsburgh Steamship Co. which docked at Two Harbors at 4:30 pm on March 29, and began loading immediately. Other boats arrived at Two Harbors on March 30.

★The 1952 annual report of J. A. Beecroft, mine inspector for Itasca County, Minnesota, which includes the western portion of the Mesabi Range, shows 50 active and 27 inactive mines in the county. There were 116 men employed underground and 277,019 tons of underground ore was shipped. Itasca County pits shipped 12,663,338 tons of ore and moved 33,776,433 cu. yd. of stripping. Two fatal accidents occurred during the year. Average daily wages in 1952 were $11.48. The heaviest shipper was the M. A. Hanna Co., with 5,169,734 tons, followed by Cleveland-Cliffs Iron Co. and the U. S. Steel's Oliver Iron Mining Division. Hanna Co. also moved the most stripping, this totaling 14,458,852 cu. yd. The Hill-Annex mine, long the county's leading shipper, has settled down to a less strenuous old age. It shipped 638,067 tons. With its new facilities for beneficiating lower grade ores, it may be able to maintain close to that figure for many years.

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MONTANA

★Butte Copper & Zinc Co., Butte, held its annual meeting of stockholders on April 15, 1953. The company's properties, operated under special management agreement by the Anaconda Copper Mining Co., produced 300,606 wet tons of ore in 1952, compared with 302,379 wet tons in 1951. Gross proceeds from sales of metals in 1952 amounted to $6,671,116. In 1951 gross proceeds were $7,114,242. Prices of lead and zinc were lower in 1952 than in 1951, and manganese sales were lower in the past year due to a repair shutdown of the Anaconda plant during August. In 1952 net income was $498,361, equal to 83¢ per share, as compared with a net income of $766,196 for 1951. During 1952 stockholders received 75¢ per share from earnings. A. A. Shelare, of New York City, is president of the company and Samuel Barker, Jr., Butte, is consulting engineer.

★Montana State College, Bozeman, Mont., has published a bulletin entitled: "Electrolytic Synthesis of Battery-Grade Manganese Dioxide" by Lloyd Berg and George E. Lohse. This is a highly interesting pamphlet and used for the experiments were manganese carbonate ores from Philipsburg and Butte and pyrolusite from Butte.

NEW MEXICO

★United Mine Workers of America, District 50, has made its first entry into the potash mining district at Carlsbad. The union has a one-year contract with Southwest Potash Co., a new operator in the area.

★Closing of the Lynchburg mine at Magdalena in March ended lead-zinc mining in New Mexico except for the U.S. Smelting, Refining & Mining Co. mine at Bayard. There 175 members of the Grant County Miners Association recently agreed to a cut in wages from $1.75 to $1.40 per hour in order to keep the mine in operation.

★New Mexico pumice production is in a decline, but perlite production is gaining. Local mining men say it is because of lack of grade maintenance by pumice producers.

★The fertilizer boom in this country is apparently subsiding, due to lower farm prices. Companies in the Carlsbad area which last year were shipping potash as fast as they produced it are now using storage facilities.

Horace W. Albright, president of the U.S. Potash Co., has expressed fear of foreign competition, and the *P.C.A. Miner*, organ of the Potash Company of America, in its March issue says:

"We must also take into account the increased activities of foreign producers. Although the East German and West German, French and Spanish producers are concentrating largely on potash markets in Europe, they can

become a competitive threat to American producers. There is some muriate of potash in the warehouses on the East Coast which came from the Eastern Zone of Germany. Our sales department reports that the price of this potash from the Russian-occupied zone is much lower than domestic prices."

NEW YORK

★New York State produced nearly one-third of all talc mined in the United States and over 10% of the world output in 1951, according to the latest available figures announced today (March 12) by the New York State Department of Commerce.

Data for the industry show that approximately 175,000 short tons of talc, valued at $4,525,000, were produced in the state in 1951, an all-time record.

The New York State deposits in St. Lawrence County are the largest and most productive of their type known in the Western Hemisphere. The remainder of the state's production comes from one mine in Lewis County. The United States is a world leader in the production of this mineral.

★The U. S. Steel Corp. has bought 287 acres of land near Pyrites, where large deposits of copper pyrites have been reported. The land is in the foothills of the Adirondacks.

NEVADA

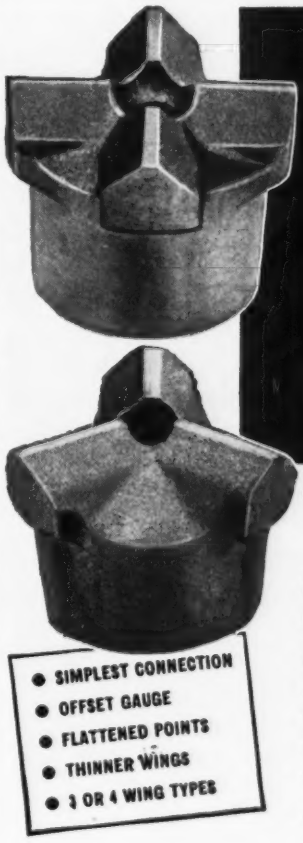
★Another strike has been made on the site of the Comstock Lode. The find was made by Fred Hess on ground leased from Zeb Kendall, both of Virginia City, and Hess is now trying to determine the extent of his strike. Some of the ore is high grade, according to reports. Mining men in the district say it is the most promising thing found on the Comstock in recent years.

★C. P. Williams and Associates, new owners of the Cherry Creek Tungsten mines and mill in White Pine County, have announced plans to produce 50 tons daily. Operations will be carried on in cooperation with Baltimore Camas Mines, Inc., also headed by Mr. Williams. Most of the ore will be milled at the Baltimore Camas mill, but some of the higher grade will be treated at the Cherry Creek mill. Laurin Smith is general manager of the company, D. E. Anderson is mining engineer, and Blaine Steel is mine foreman.

★Sale of the Big Dixie Valley copper deposit to Consolidated Copper Mines Corp. has been confirmed, although no statement has been issued for publication. Papers were signed at a Reno bank late in February for the Air Lanes Copper-Gold Mining Co. and the Table Mountain Copper Co. Both are Nevada organizations holding extensive claims in the Dixie Valley area dating back to 1937. The transaction included a substantial down payment and a flat per-ton fee to be paid as copper is mined until the full purchase price is completed. Exploration work is now going on in Dixie Valley. It is reported that Consolidated plans to start operations there when their mining property in eastern Nevada reaches the unprofitable point.

★Hot water from the natural hot springs south of Reno will be used to leach manganese ore in a mill now being constructed in the Steamboat Springs area. Nevada Ore Refining Co. is doing the work and ore will be provided from four deposits 12 mi. southeast of Carson City. Ore has been produced and stockpiled during the last several months and the mill is expected to get into production in the near future. The Johnson Tank Co. of Glendale, Calif., has the contract for installing the tanks, and the concrete work has been completed. J. E. Martie of Reno is president of the Nevada Ore Refining Co., and H. V. Burgard is superintendent and director of the work.

★New buildings to replace those destroyed in a recent fire are being constructed at the Union Lead mine in Washoe County, and development work in the shaft is continuing. Production of lead and silver ore is expected to start in the very near fu-



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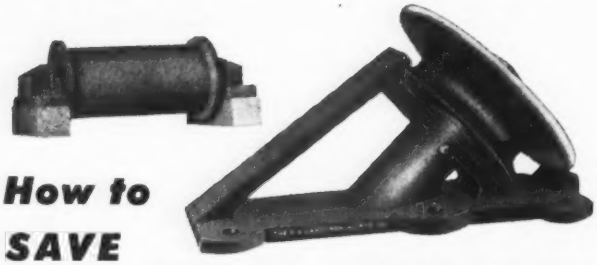

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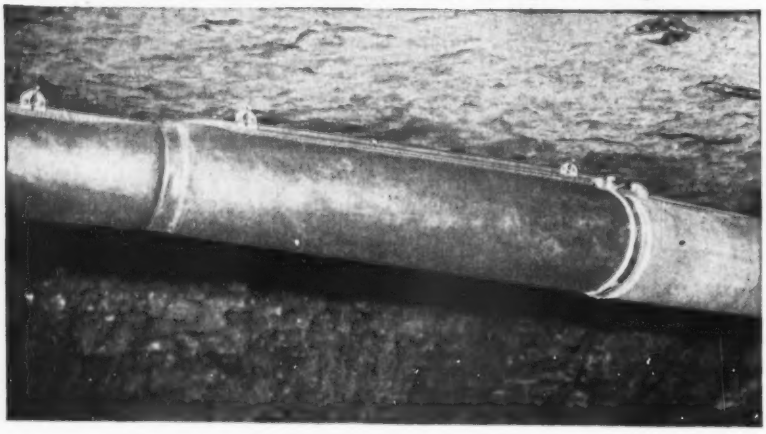

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Nevada *(Continued)*

ture. During the last several months constant work has been in progress to repair the mine and get the surface equipment in shape. This project was hampered by the fire which burned timbering in the shaft as well as the machine shed, but the damage has been repaired and work is progressing on schedule.

OREGON

★Mining claims on Pacific Northwest public lands are being voided at an increased rate since appointment of a mineral examiner by the U. S. Forest Service and an inspector by the Federal Bureau of Land Management.

More are slated to come under the scrutiny of public hearings scheduled in major cities of the region in April and May and officials indicate the pace of such investigations into questionable mineral claim locations will accelerate through the year.

Roscoe E. Bell, regional chief for BLM, reports 72 claims have been ruled null and void in recent weeks and that 124 are involved in hearings set for the next two months. The bulk of these already outlawed are in the Pinchot National Forest in the area of Randle, Wash., involving some 2400 acres. Of the total, 57 stakers failed to reply to hearing summons and 16 were ruled invalid because they were staked on power sites previously withdrawn by the government. The Rogue River National Forest in southwest Oregon, center of much of Oregon's chrome and placer gold mining developments, is the other major area of claims investigation. Fifteen have been voided and BLM reports 110 claims embracing 17,600 acres will be tested in a series of eight hearings due to start at Medford, Ore., May 12. These are all located in the Union Creek recreational area withdrawn to mining entry in February, 1950, and the contested acreage represents a substantial portion of an estimated 45,000 acre spread of claims which have interfered with logging and recreational use of the Upper Rogue River Valley.

Other hearings are set for Boise, Idaho, April 27-29 on nine claims in the Lucky Peak Dam reservoir area of Oregon; at Baker, Ore., April 24 on three claims in Whitman National Forest; and at Seattle, May 8, on two Snoqualmie National Forest claims.

The increased investigation activity was prompted by mining industry spokesmen's demands for agency checks on a situation resulting from high timber values which brought large scale staking on lands where the mineral value is doubtful. Until early in January, when both federal agencies announced assignment of additional personnel to the claims inspection work, the federal agencies have insisted they were unable to keep abreast of the volume. Elton Hattan,

BLM mining engineer, explains one blind spot in the laws is the requirement that a claim staker need only file his location at the county courthouse, but not with any affected agency. As a result, Hattan reports, the agency knows nothing of the claim until its field men run onto the stakes, often after logging plans have been made. They then must be suspended in deference to the ostensible miner. Some legitimate miners have also complained they occasionally stake a claim and start development and belatedly learn the area has been withdrawn for power site, summer homes or other allowable purpose.

★The Oregon Department of Geology and Mineral Industries report lists 48 chrome ore claims currently known to be active in the state and 13 chrome concentrating plants.

Breakdown of the extensive chromite development placed 36 active properties in Josephine County, seven in Curry County and two in neighboring Jackson County, all in the southwest Oregon corner bordering California. Two chrome ore mines are active in central Oregon's Grant County. Concentrating facilities are scattered in the general area of the mines, some operated jointly by mine operators.

Josephine County also leads the list of gold placer properties with six active in the rugged mountain alleys of that area. One operated in neighboring Douglas County. The others are in eastern Oregon's Baker County, which shares with Grant County the two lode mines.

TENNESSEE

★New Jersey Zinc Co. is purchasing an additional 1,000 acres of land in Clinch Valley for a new site of operations. The company has been core drilling and prospecting in that section of Tennessee to the Virginia line for the past two years.

Tennessee Coal & Iron Division of U. S. Steel Corp., has drilled in the Clinch Valley and is about ready to begin operations about 4 mi. east of Eidson.

UTAH

★Construction of the $1.25-million Kennecott Copper Corp. research center on the University of Utah campus is so far advanced that occupancy is now expected late in 1953. The new center will employ 50 scientists, technicians, and laboratory assistants. All of Kennecott's operations in the western region are to be served by the new center, which is to concentrate on investigations into all phases of mining, smelting and refining.

★Ore trains began using the new 7,042 ft. long haulage tunnel at the Bingham open pit mine of Kennecott Copper's Utah Division on March 30. The tunnel, at the 5,480 ft. level of the big mine, was under construction two years.

The 1⅓-mi. long bore was completed by the contractor some months ago, but was not opened until mine pit shovels dug their way through the orebody to the pit end of the tunnel.

The long bore is the second to be completed by Utah Copper at the pit. The first, 4,650 ft. long, was finished in 1946 to link the 6,060 level of the pit with canyon trackage leading to mills and refineries.

★The Vanadium Corp. of America has leased 65 mining claims in the Capitol Reef region of Wayne County, Utah. Also, VCA is negotiating with the Atomic Energy Commission for a contract involving expanded milling capacity at White Canyon near Hite, Utah, where it now operates a pilot plant. Cost of the project has been estimated at from $1.5-million to $3-million.

★Expansion of the Garfield Chemical and Manufacturing Co. sulphuric acid plant is at the halfway mark, according to E. McL. Tittman, president. The firm, a joint affiliate of American Smelting & Refining Co. and Kennecott Copper Corp., launched its expansion at Garfield three years ago, partly to eliminate sulphur dioxide fumes from converter operations.

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Utah *(Continued)*

possible production of an additional 250 tons of sulphuric acid per day at the plant, which is near the Garfield copper smelter of AS&R. This will boost total production of sulphuric acid to 700 tons daily and will use up all the available gas from the smelter's converters, Tittman says.

Completion of the final unit will coincide with the completion of a nearby $5-million phosphate fertilizer plant which is being erected for the Western Phosphates, Inc. The latter firm is a subsidiary of AS&R, Kennecott and Stauffer Chemical Co. and is expected to take virtually all the 250 ton production of the new unit.

★Park Utah Consolidated Mines Co., one of the two big Park City district firms planning to merge into United Park City Mines Co., had a net loss of $18,281 in 1952. Company officials attributed it to strike difficulties and a shutdown that has continued since June 26, 1952, in the wake of a drop in lead-zinc prices. The firm made a profit of $272,412 in 1951. Neither figure includes depletion.

Paul H. Hunt, vice president and general manager, stated in his report that wage demands of the United Steelworkers of America, CIO, had called for an increase of 15%.

Due to "the weakness in metals prices and the anticipation of further declines which have since been confirmed," the company refused to meet the demands.

WASHINGTON

★Howe Sound Mining Co. reported difficult operating conditions and shortage of underground labor at its Holden mine in Chelan County, during 1952. The problem of caving from the hanging walls of stopes has not been completely solved. Normal extraction rate was not reached in 1952, reducing tonnage milled. The labor situation has improved and it is expected more normal production may be reached within a few months. A pension plan for hourly employees at the Chelan property was to be outlined at the annual meeting April 21 in Portland, Maine. Net income before depletion was listed by the company at $2,778,990, or $1.69 a share. J. J. Curzon is general manager at the Holden mine.

★The Oriole lead-zinc-silver property located in Pend Oreille County across the Pend Oreille River from Metaline Falls, has been taken over under lease and option by Art Betchart, chief mining engineer for Pend Oreille Mines & Metals Co., and E. O. Dressel, Jr., of Metaline Falls. The initial operation will be by a small portable concentrating mill.

★Washington State produced 18,000 oz. silver in January, an 18% decline from December figures. Production of

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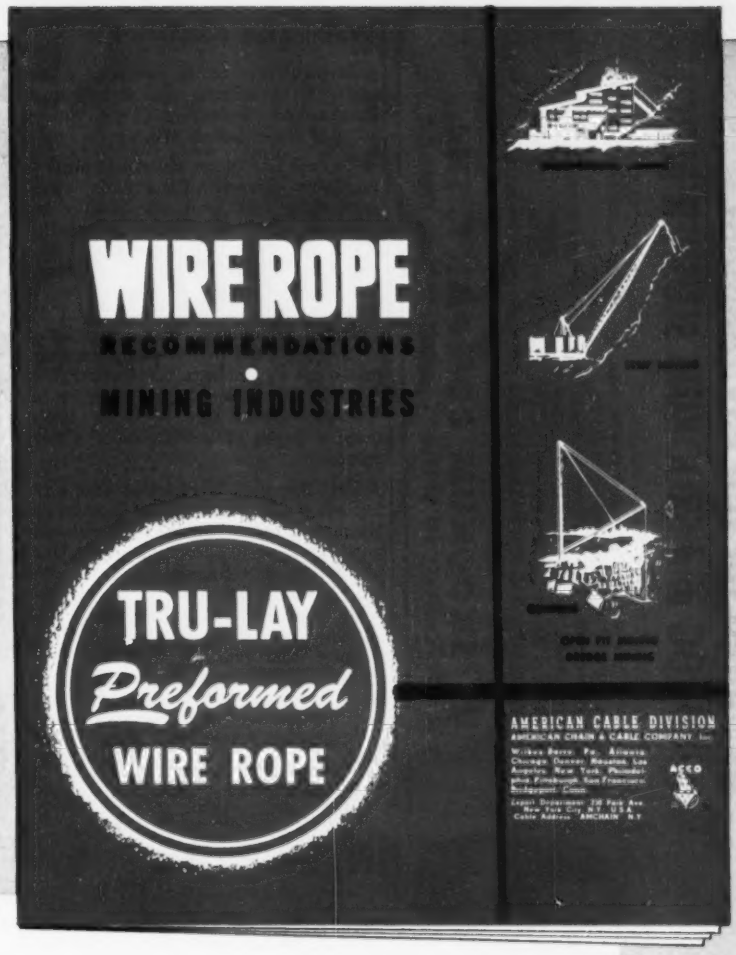

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Washington *(Continued)*

gold was 3,210 oz. in January, showing a 30% decline, due chiefly to a decrease in production at the Holden mine of Howe Sound Mining Co.

★The old Gladstone Mountain mine in northern Stevens County is again producing rich lead ore and is reported to have shipped to the smelter at Trail, B. C., in February. The property, belonging to the Gladstone Mountain Mining Co. of Spokane, is being operated under a lease by A. G. Lotze of Boundary, Wash. Mr. Lotze is also reported to have shipped some crude ore by truck to the Bunker Hill & Sullivan Mining Co's smelter at Kellogg, Idaho. Ore is being taken from a depth of 200 ft. from a new chimney.

★The Chewelah local union 606, having about 250 employees of Northwest Magnesite Co., voted "overwhelmingly" in March, according to Ott Orr, international representative for the Steelworkers, to disaffiliate with the Mine, Mill & Smelter Workers' union in the mining district of Stevens County, and affiliate with the CIO United Steelworkers. Mr. Orr reported that the Steelworkers also won collective bargaining rights at American Smelting & Refining Co.'s Van Stone mining and milling project in the Northport mining district.

IN CANADA

BRITISH COLUMBIA

★**Canam Copper Co. Ltd.** reports contract on its new low level 3,000-ft. tunnel is in full swing at its property on the Hope-Princeton Highway 128 mi. east of Vancouver, with three shifts planned. Main objective is the downward continuation of the copper-gold-molybdenum orebody opened on levels above.

★**High freight rates charged** in the West on base metals were a major contributing factor in closing of 18 mines in the province last year. That's what the Mining Association of B. C. told the Board of Transport Commissioners in a hearing at Vancouver, at which 11 organizations presented proposals for equalization of rail rates across Canada.

C. H. Mitchell, speaking for the Mining Association, said that because of low metal prices and high freight rates there was a "wasteful depletion" of B. C. natural resources as only higher grade materials are mined.

★**New 10% resources tax** on primary mining operations in B. C. has been shelved by defeat of the province's Social Credit government over a new formula for financing education. The legislature has been dissolved by the lieutenant-governor at the request of Premier W. A. C. Bennett and a general election ordered for June 9.

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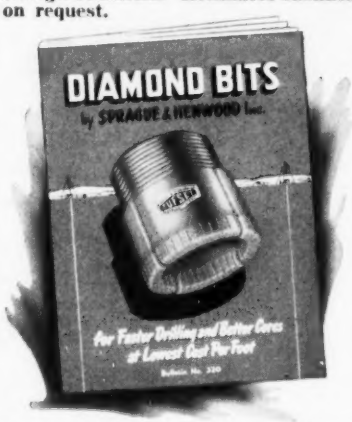

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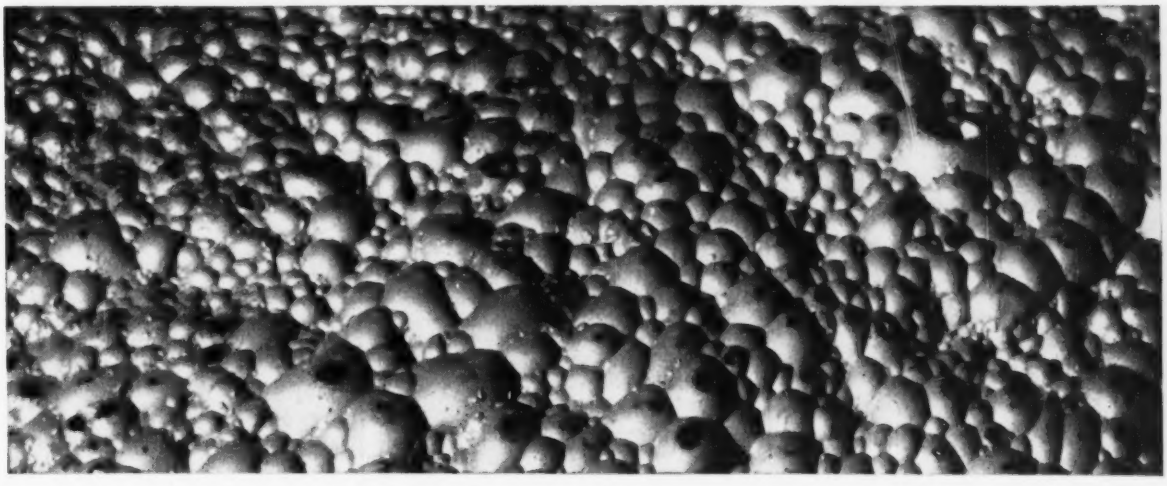

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6

Canada *(Continued)*

★**Aluminum Company of Canada** will be able to proceed with development of the Kitimat townsite to prepare for start of smelting operations a year from now, despite defeat of the Social Credit government. While the government dropped all controversial legislation after its house defeat, it went ahead to secure voting of $94-million in necessary funds for interim government operation and 55 non-contested bills, among them a bill to incorporate Kitimat townsite. The new town will be operated by elected representatives and it was feared failure to pass the bill would delay public housing developments and other work necessary to provide for a starting population of 6,000 to 7,000. Had the bill not been passed Alcan might have been forced to provide temporary housing and conduct municipal services which the company has sought to avoid. Alcan already has spent approximately $25-million in development of Kitimat, including laying out a townsite designed for an eventual 50,000 persons.

★**An increase of 20¢ an hour** will be asked by International Union of Mine, Mill & Smelter Workers when it opens negotiations for 6,000 Consolidated Mining & Smelting Co. workers at Trail and Kimberley. The union is proposing a "security of employment" clause for contracts which will seek a division and rotation of work in event of layoffs.

★**Britannia Mining & Smelting Co. Ltd.** has reacted to recent metal price changes by switching production emphasis at its Britannia mine on Howe Sound from zinc back to copper. Annual report of the Howe Sound Co., a U. S. firm which owns all outstanding capital stock in Britannia, says revision has been undertaken to stress copper and continue zinc output only from sections which are sufficiently high grade to be mined under the current price for zinc.

★**Granby Consolidated Mining, Smelting & Power Co. Ltd.,** major copper producer at Allenby, is flying supplies for a diamond drilling program from Stewart (on Portland Canal) north to copper claims obtained under option from the Karl Springer group which staked the properties two years ago. L. T. Postle, Granby general manager, says the deposit appears to be low-grade copper but might be of important size. Equipment is being airlifted by ski-equipped aircraft. The company may spend up to $100,000 drilling the claims.

★**Canadian Johns-Manville Co. Ltd.** of Montreal in a deal with Cassiar Yukon Gold Mines has acquired an interest in asbestos claims in the McDame Creek area of the Cassiar mountains. They're near the new producer, Cassiar Asbestos Corp. Ltd.

★**Noranda Mines Ltd. plans to explore** several copper prospects on the B. C. coast this year. The firm said in its

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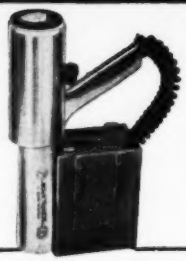

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Canada *(Continued)*

annual report that prospecting and examination resulted in staking and optioning several copper prospects in the coastal area which will be explored in the coming year.

MANITOBA

★**Berens River Mines** reports that some 3,000 ft. of drilling has been completed on the low grade nickel prospect at Mystery Lake, northern Manitoba. Results have averaged 0.3%-0.4% nickel. The property is under option from Dee Exploration Ltd.

★**God's Lake Gold Mines** has commenced an electro-magnetic survey of its 147 claim property adjoining east of Sherritt Gordon's main holdings at Lynn Lake. It is anticipated that five months' time wil be required to complete the extensive program which has been planned.

★**Hudson Bay Mining & Smelting** reports that production at the Flin Flon mine during 1952 was less than in 1951. Mine production of ore was reduced as the slag fuming plant was brought into full production. Net profit for 1952 was $14,799,273. Ore reserves at year end are estimated at 17,028,000 tons averaging 0.075 oz. gold, 1.06 oz. silver, 3.21% copper, and 4% zinc per ton.

Development work in subsidiary operations gave encouraging results. At Schist Lake, the shaft was deepened 72 ft. below the 1,100-ft. level, and 4,084 ft. of drifting and raising done on various levels between the 150 and 1100 ft.

At the North Star mine, shaft sinking below the 900-ft. level continues. A permanent double drum hoist was installed on surface.

At Birch Lake, the main shaft site has been cleared and regular sinking operations will start in the spring.

At Cuprus Mines, Ltd., in which Hudson Bay holds a 79% interest, ore reserves are estimated at 114,500 tons averaging 0.033 oz. gold, 0.77 oz. silver, 3.19% copper and 5.6% zinc.

In Kluane Lake area of the Yukon, an extensive diamond drilling program is planned on a copper-nickel discovery made last year.

★**Sherritt Gordon Mines Ltd.** announces that it has made arrangements with Harrisons & Crosfield (Canada) Ltd. to handle the sale of its output of ammonium sulphate fertilizer. Sherritt Gordon estimates that its chemical metallurgical plant at Fort Saskatchewan, which is scheduled to go into production early in 1954, will produce about 65,000 tons of ammonium sulphate fertilizer per year.

Harrisons & Crosfield (Canada) Ltd. is part of a London firm with branches or associate companies in the United States, India, Ceylon, Pava, Sumatra, Australia, New Zealand, Formosa, Borneo and Malaya.

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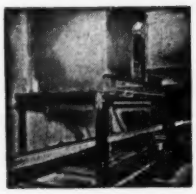

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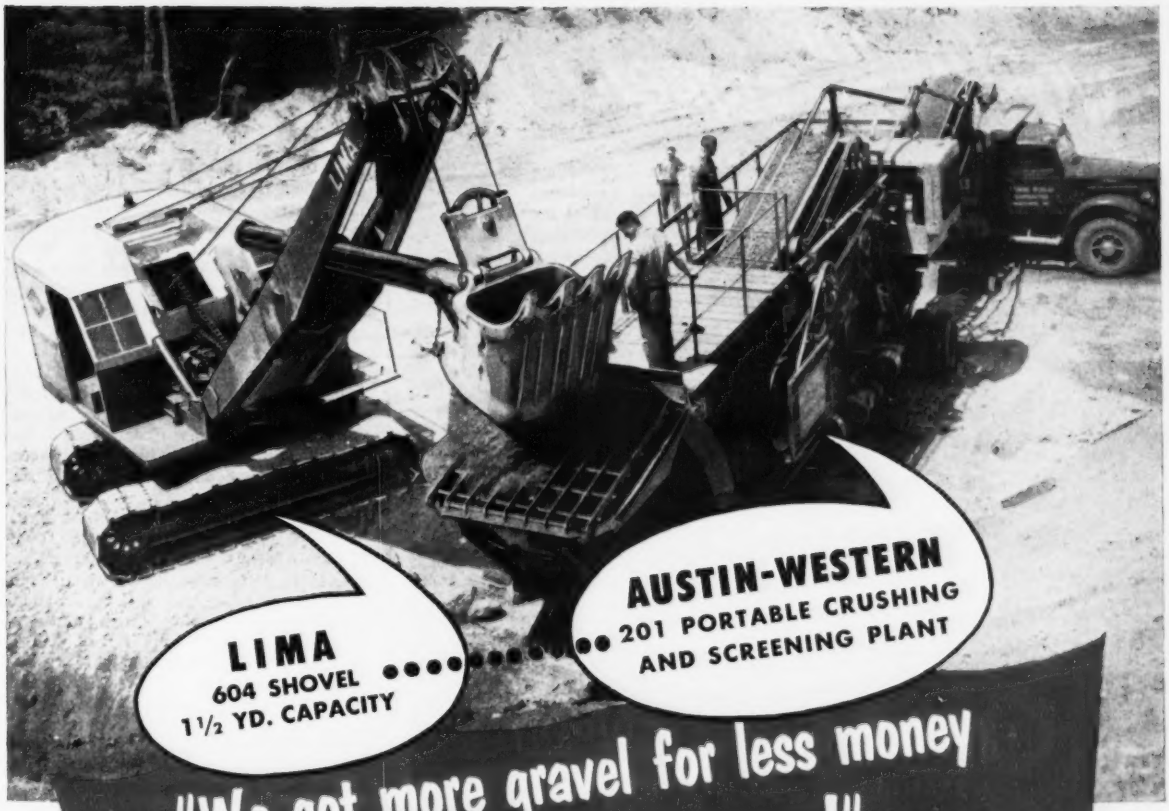

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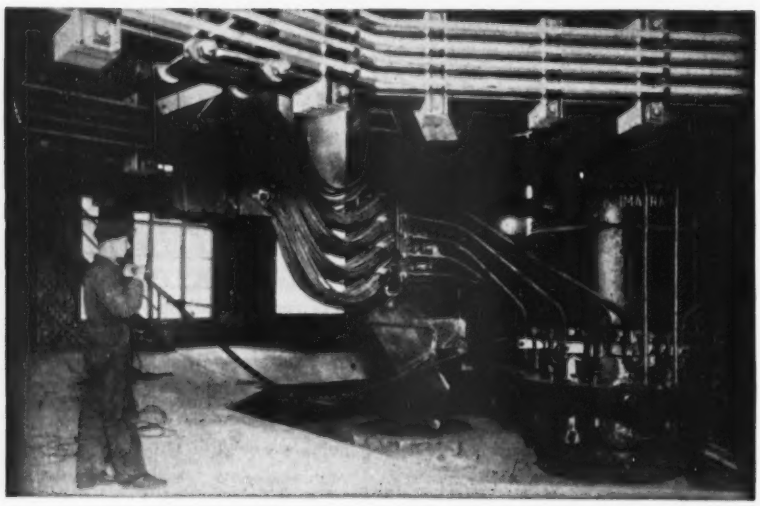

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NORTHWEST TERRITORIES

★**Pine Point Mines Ltd.,** subsidiary of Consolidated Mining & Smelting Co. of Canada, undertaking exploration of the lead-zinc area on the south shore of Great Slave Lake, reports satisfactory progress in 1952, with a favorable mineralized belt which extends for 36 mi. now covered by a total of 1274 claims. In a different area but within the limits of the original concession five gas and oil permits were obtained in a possibly favorable area and will be explored this year by further drilling. During 1952 more than 41,000 ft. of drilling further outlined the mineralized areas. Several million tons of ore were indicated, about half of which is minable by open-pit methods. A suitable area for shaft sinking was located, the shaft collared and a headrame, dry, power house and oil storage completed. A road 80 mi. long linking the property with Hay River was practically completed and will be finished this year, permitting truck haulage from railway at Peace River. Total expenditure on the property since its inception is over $1.6-million. Program for 1953 includes further study of orebodies, sinking of a shaft to determine actual mining conditions, improvement of camp facilities and the Hay River-Pine Point road.

ONTARIO

★**Hollinger Consolidated,** Canada's second biggest gold mine, increased its net earnings in 1952 by 27% to 24¢ per share. This diversion from the general gold mining trend, however, was due to a special and (the company hopes) non-recurring factor. In 1951 production was suspended for eight weeks by a labor strike. The year, Hollinger's 42d, ended with ore reserves standing at 5.4-million tons worth $57.6-million. Total production to date exceeds $432-million, total dividends $129.3-million.

★**International Nickel** had net profits of $3.90 per share in 1952, third largest in its long history. Sales, tonnage milled, and ore reserves all made new records. Another feature was outside exploration. Though Inco can see 25 years' ore supply without difficulty, the management doubled its exploration budget and did 499,906-ft. of exploratory drilling, spread over a great many areas.

★Although gold production and earnings were lower last year, **Dome Mines** maintained its position as one of Canada's strongest mining companies. Net profit was 75¢ per share compared with 81¢ the year previous. During the year the company received its first dividend from Campbell Red Lake, its young gold mining subsidiary, the last of Campbell's production loan having been repaid with in-

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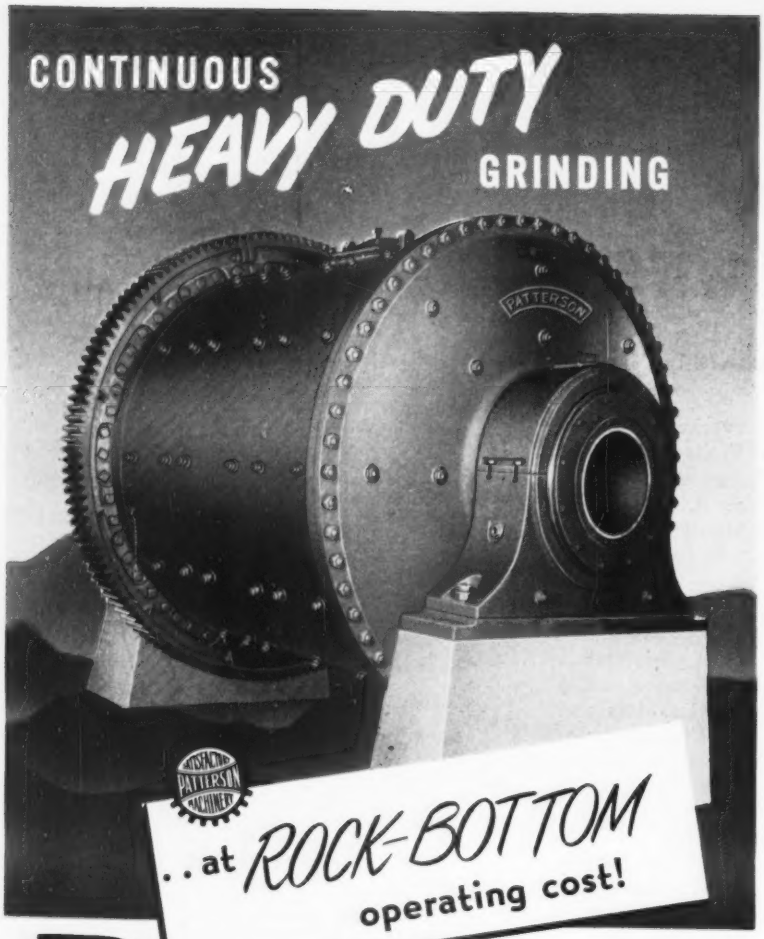

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MONTREAL

Canada *(Continued)*

terest. During the year, too, it brought Mindamar Metals Corp. to production. Mindamar, a Nova Scotia zinc-lead-copper producer was financed by a $3,245,000 loan from the big gold producer, which also holds slightly more than 50% of Mindamar's authorized and issued capital.

★Underground exploration by adit is planned for Ontario's **newest uranium prospect,** the property of Centre Lake Uranium Mines near Bancroft in the Southeastern part of the province 130 mi. from Toronto. Surface work and diamond drilling returned encouraging indications of pitchblende.

QUEBEC

★Lower profits were shown in 1952 for **Noranda Mines.** Noranda's net was $5.45 per share versus $5.70 in 1951, metal revenue having dropped from $29.9- to $20.7-million. Highlight of Noranda's year was the progress made by Gaspe Copper mines, which now has 67-million tons of ore in sight (grade 1.3% copper) and has increased initial milling objective in the plant now being established to 6,500 tons daily, with production expected to start late next year. Plans for Gaspe, in which Noranda holds a large majority interest, call for eventual establishment of a town of 4,000 people. The location, some 60 mi. from the Gulf near the tip of the Gaspe Peninsula, was rugged wilderness a couple of years ago.

Production should start next year, too, at the sulphur-iron plant to be built by Noranda at Welland, Ont., where iron oxide, sulphur, and sulphur dioxide will be produced from the pyritic ore of the Horne mine. This plant will be just the first of a series, as the Horne contains 100-million tons of pyritic ore.

In the meantime, copper-gold production continues without abatement at the Horne (the original Noranda mine). Ore reserves there, after 25 full years of mining in which 35-million tons has been extracted, still stand at 18.9-million tons, not counting the pyrite.

★Ore reserves of **Quemont Mining Corp.** reached a record high at 9.5-million tons at the end of 1952, with grade undiminished, to keep the mine an easy dozen years ahead of mill requirements. Profits of the big copper-zinc-gold producer, which adjoins Noranda's Horne mine, were lower during the year; and at $2.03 per share were just marginally above the $2 dividend paid.

★The multimillion-dollar metallurgical experiment being conducted at Sorel, Que., by Kennecott Copper Corp. and New Jersey Zinc Mines is gradually proving successful. Operations of **Quebec Iron & Titanium Corp.,** based on the world's biggest deposit of ilmenite, have made good

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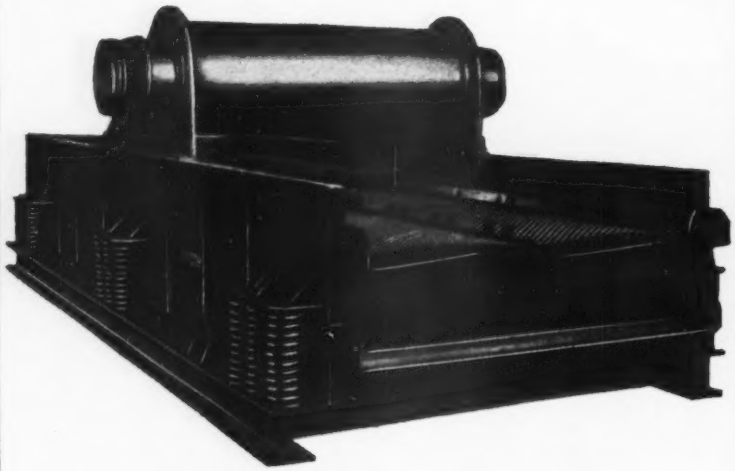

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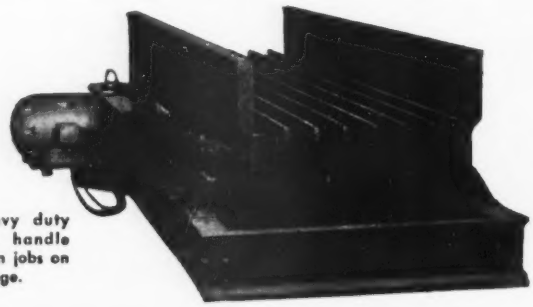
The 6' x 20' Simplicity Model OM Double Deck Screen shown here is typical of Simplicity Screens used successfully at the great Mesabi Range in Minnesota to size and dewater iron ore. This screen, with a ⅜" opening on the top deck and a 1½mm. dewatering surface on the lower deck, is designed for heavy media concentration of iron ore.

Throughout the metal mining industry, Simplicity equipment is handling all types of preparation work from coarse scalping to fine screening and dewatering. Simplicity operating mechanism insures fast, accurate sizing and keeps production costs down.



Simplicity heavy duty scalpers also handle tough production jobs on the Mesabi Range.

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113

Canada *(Continued)*

progress during the past year. They must still be regarded as experimental, but the many problems which have made the project difficult are gradually being solved.

The big question mark in the operation has always been the production and sale of titanium oxide slag (TiO_2 concentrate). From its ore the company makes two products; high quality iron, and titanium slag. (Only laboratory attention is being given at present to production of titanium metal.) The iron has been relatively easy to produce and sell, but the slag has been the cause of many a management headache during the two years in which the treatment plant has been operating. However, the kinks are being straightened one by one, and the product is now finding gratifying acceptance in the pigment industry where its big market lies. Last year sales increased from 7,179 to 34,739 tons; and this year they should show another very healthy increase. The last two of the company's five big electric furnaces are being initiated this month.

★**Federal Metals Corp.**, financed and controlled by East Sullivan Mines and Sullivan Consolidated Mines, reports that "very satisfying" progress was made in 1952 in underground development of its big base metal prospect property in Lemieux Twp., Gaspe area. A total of 8,000 ft. of crosscutting and drifting has been done on the adit level, with good lengths of ore disclosed. The company, however, is in no hurry to press production plans with lead and zinc at current price levels; especially since power will not be available until late next year, and since the new road to the property is still under construction. Big emphasis during the coming summer will be placed on surface exploration, a large part of the company's 12,000 acres still being unprospected.

CORRECTION

March E&MJ reported that Pershcourt Goldfields, Ltd. ore reserves in Barraute Twp., Quebec, totaled 9.753-million tons of zinc-silver ore with lead values. However estimated ore reserves, based on the assumption that the ore zone is a continuous tabular body to a depth of 1,000 ft., total 6.763-million tons in the main zone. The main zone contains a somewhat richer footwall zone with estimated ore reserves of 2.81-million tons.

SASKATCHEWAN

★**Calder-Bousquet Mines Ltd.** has acquired three groups of claims in the Beaverlodge uranium area, one 16-claim group which adjoins the Rix-Athabasca and Goldfields Uranium acreage now under development. A

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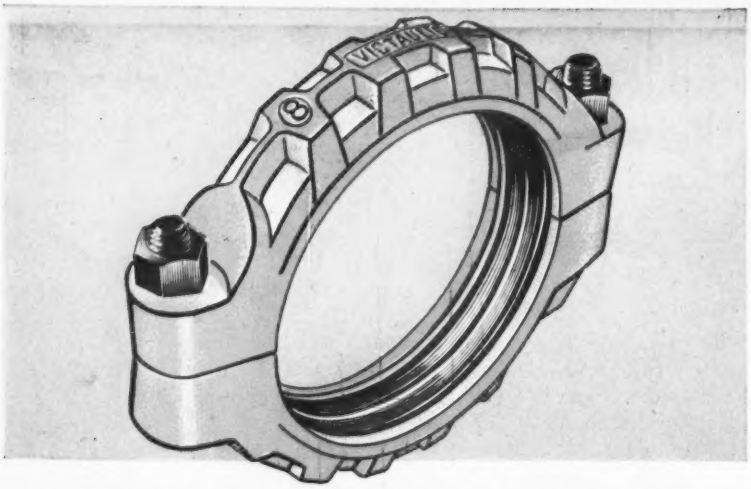

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Canada *(Continued)*

number of pitchblende occurrences have been disclosed by preliminary prospecting and surface work.

★**Western Potash Corp.** has had continued success in clearing up a quicksand condition at its projected production shaft near Unity. The quicksand has been dried out on the east side and the collar lowered to shut off the sand. Drying of the other side, with an electro-osmosis system being used, was continuing.

IN LATIN AMERICA

CHILE

★**A decree was signed** on March 19 which permits the Chilean Government to take complete control of any nitrate plant which ceases operation if, in the opinion of the President, this might cause economic or social trouble and harm to the interests of the country. The law is said to be aimed against Tarapaca and Antofagasta Nitrate Co. which has been seeking tax relief in order to continue operating.

★On March 28, *The New York Times* reported that Harry F. Guggenheim, chairman of the **Anglo-Lautaro Nitrate Co.** stated that the nitrate industry in Chile had reached a serious "crisis" and would be destroyed unless the government granted relief. Unless the government acts, he said, it would be preferable that it construct its own plants.

"Moreover," he continued, "if the government so desires, I am ready to propose and recommend to the Anglo-Lautaro stockholders that they sell out to the Fomento Corp. [government agency] at a price representing replacement cost or the cost of producing tonnage equivalent to our present production."

Mr. Guggenheim said that because of high production costs in this country, Chilean nitrate competed with difficulty against synthetic nitrate in the world market, and added that Chilean nitrate investments have been a complete failure from the standpoint of financial returns. He predicted that the government would destroy the industry by the burden placed upon it.

★**The Central Bank,** making use of the special powers given by Congress, fixed the price at which Chile will sell electrolytic copper at 39½¢ and 35¼¢ for fire refined copper f.a.s. Chilean ports. It also fixed the price at which it will buy the copper from the producing companies, Andes Copper Mining Co., Chile Exploration Co., and Braden Copper Co. at 24½¢. These measures were taken as soon as the new administration in Washington decontrolled

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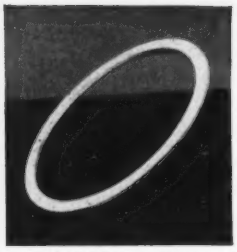
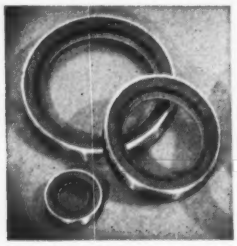
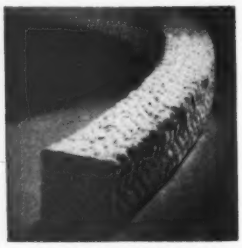


GARLOCK GUARDIAN Asbestos-metallic Gasket



GARLOCK KLOZURE Oil and Grease Seals for Bearings



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Chile *(Continued)*

the price of copper. Chile obtains 75% of its foreign exchange and a considerable part of its revenue from copper.

★**Compania Sud-Americana de Vapores,** a Chilean shipping company, has ordered a new 10,000-ton steamer from British shipyards specially designed to carry iron ore from Bethlehem iron mines El Tofo and Romeral, Coquimbo Province, to the new steel mill in San Vicente. The ship will load 10,000 tons of coal in Norfolk, U. S., on its way to Chile from England. American coking coals have to be mixed with Chilean coal to make a good metallurgical coke for the iron blast furnaces.

★**Last year El Tofo iron mine,** belonging to Bethlehem Steel Co., produced 2,300,000 tons of 60% iron ore, mostly hematite. Of this total, 162,000 tons were shipped to the steel mill in San Vicente in southern Chile and the rest to Sparrows Point in the United States. As El Tofo mine will be worked out in a few years longer, the same company is getting ready for exploitation of the Romeral deposit near the port of Coquimbo.

★**The government has created** the Ministry of Mines, and the President has nominated an engineer, Sr. E. Paredes, to fill the post of Minister for Mines. This Ministry will operate the following agencies: The Mining Bank; Bureau of Mines and Oil; Bureau of Nitrate and Iodine and institutes for the development of mining.

★**Because of the reduction** in the copper price in Europe and in the rate of dollar exchange, the Mining Bank has reduced its schedules for buying copper ores and concentrates as follows: 25% copper concentrate, $132, scale up and down per unit, $6.10; 10% ore, $36.50, scale up, $6.10, scale down per unit, $6.65. These prices are per metric ton.

★**Because of the blowing in** of the Paipote smelter near the town of Copiapo, Atacama Province, the Mining Bank of Chile bought a record tonnage of copper ores and concentrates last year. Their value added up to $8.5-million. The Bank also bought $2.8-million worth of gold ores and $104,000 worth of lead ores.

★**The President of the Republic** accompanied by the Minister of Finance and the President of Anaconda Mining Co., Mr. Dwyer, one of its vice presidents, Mr. Glover, and Mr. Michels, vice president in Chile for Chile Exploration Co. and Andes Copper Co., visited La Africana Copper mine recently. This was developed by a subsidiary of Anaconda, known as Santiago Mining Co., previous to 1927. The Africana mine is west of Santiago near the Pudahuel lagoon. About 3-million tons of copper ore, running about 4%, has been blocked out here. Anaconda executives may plan to build a 600-ton flotation mill, making a 25% copper concentrate which would be sold to the Paipote smelter or exported. Accord-

ing to the Anaconda officials, work on this mill would be started as soon as an agreement is reached with the Chilean Government as to the return of principal and interest on the capital needed to bring the mine into production including the capital invested in its development.

★Andes Copper Mining Co. has been diamond drilling the copper outcrops to the northeast of the Potrerillos mine, known as Indio Muerto. Considerable geological work had previously been done on Indio Muerto by the Anaconda geologist in Chile, Mr. Swayne.

COLOMBIA

★**Hermides Padilla**, owner of the barium mines near Bucaramanga and Ocaña, reports that his company is producing 150 metric tons a week of barium sulphate for drilling mud. Mr. Padilla's Industria de Pinturas y Minerales, Bogota, is planning to increase output to 600 tons a week shortly. This may then allow the company to enter the Venezuelan market.

BOLIVIA

★**The Bolivian Government** has canceled its agreement with an Argentine financial group for construction of a tin smelter and certain other projects because of the failure of the group to carry out the terms of the contract, according to the Bolivian Minister for Public Works, Adrian **Barrenchea**. The Argentine group, headed by Salim Chacur who is at present in La Paz, was "interested in extending the specified installment dates."

MEXICO

★**Mining nationalization** would practically mean Mexico's economic suicide, asserted Ing. Gustavo P. Serrano, president of the Mining Chamber, discounting statements published in Mexico by José Luis Ceceno, a top economist, that government should take over major mining operations controlled by three large foreign companies.

Ing. Serrano said, "By nationalizing the mining industry, the government would create a problem most difficult to solve as there are thousands of mines in Mexico, large and small, that could not be controlled. And the government receives great sums of money from mining in the form of tax payments without any great effort on its part."

★**A rich deposit** of manganese, tungsten and iron has been reported near La Rumorosa, Juarez Municipality, Baja California, in the Juaraz Sierra Mountains, 10 mi. from the Mexicali-Tijuana road. Claims were filed at Mexicali by José Cota, Ricardo Palomares and Eustaquio Valle, all of the Baja California capitol. A small manganese-tungsten mine started last year is being worked near the claims by Alfredi Araiza of Mexicali

★**Moves in the U. S.** to acquire 500,000 tons of Mexican manganese prompted the National Transformation Industry Chamber, Ing. José Crowley, President, to urge control of the exploitation of Mexico's natural resources. It warned that undue mining of manganese could provoke a scarcity of that product for Mexico and even exhaust Mexican manganese deposits.

★**The National Institute** for the Investigation of Mineral Resources, Ing. Raul de la Pena, director, is checking the discovery of a reportedly large antimony deposit near San Cristobal, Minatitlan Municipality, Vera Cruz, where a Pan American Sulphur, Mexican subsidiary is doing important sulphur work.

★**The Bank of Mexico estimates** reserves of 74-million tons in iron deposits in Colima, Jalisco, Michoacan, and Guerrero. The Bank cites El Mamey, Colima, with 12 tracts estimated to contain more than 20-million tons which average more than 64% iron; Michoacan, with one deposit that alone contains 22-million tons of top grade ore, besides Las Truchas which is calculated to contain 20-million tons of

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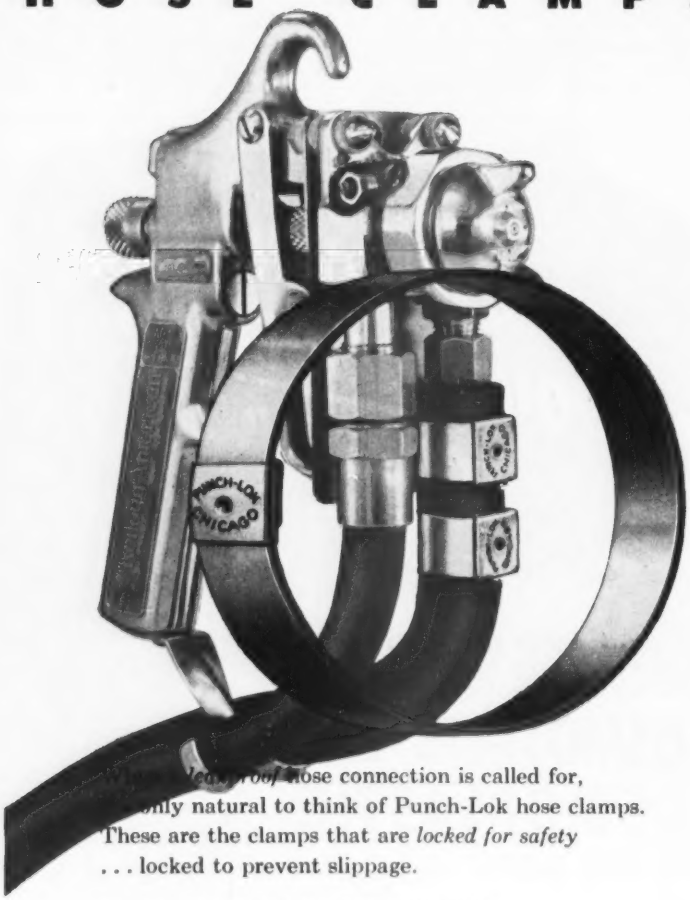

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Mexico *(Continued)*

high-grade ore. The Pluton tract, Guerrero, has a known reserve of 5-million tons. Bank geologists say that it may run as high as 6-million tons, assaying 61% iron. Guerrero also has the Chutla deposit of 3-million tons of good iron, as well as the Herculese, El Calvario, and La Calera regions each with more than 1-million tons of valuable ore. Colima, the report remarked, has at least 1-million tons of high grade iron ore at Piscila.

VENEZUELA

★**Iron ore production** for 1952 totaled 1,969,802 metric tons, compared with 1,269,610 metric tons in 1951, according to the Ministry of Mines and Hydrocarbons.

★Upon his return from the United States, Carlos Bousquet, owner of **40 manganese concessions**, located 30 km. east of Upata in the Guayana area, stated that a commission of North American technicians, engineers, and geologists will arrive shortly to study the mining project. The U. S. Bureau of Mines had invited Bousquet to Washington to report on his concessions. Bousquet explained that capital investment to develop the deposits would be exclusively national, and if any loan were made by the U. S. Government, it would have to be repaid in ore.

IN THE PACIFIC

PHILIPPINES

★**San Mauricio Mining Co.**, operated by Marsman & Co. in Camarines Sur, milled 8,500 tons in February for a recovery of 4,520 oz. of gold valued at $284,000 on the open market. This compared with 8,635 tons and 3,893 oz. in January. J. B. Stapler, manager of the mines division, announced the current development at the properties shows satisfactory results on the Sta. Monica vein. The north drift on the adit level was advanced 118 ft. on the vein which varied in width from 1½ to 2½ ft., with the average grade in excess of 1 oz. per ton over a stoping width of 3 ft. after allowing for dilution. A crosscut 155 ft. lower cut a 7-ft. vein consisting of 2 ft. on the footwall which assayed over 2 oz. per ton, then 2 ft. of low grade material in the center followed by 3 to 4 ft. of massive pyrite with copper and lead on the hanging wall which assayed 0.5 oz. gold per ton. Drifting north and south shows better than average grade ore.

★Reports from **Mindanao Mother Lode** mine near Surigao are not encouraging. During February, the mill handled 10,800 tons with an estimated

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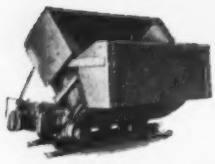
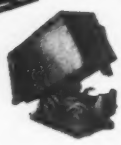

Granby-type Dump Cars

Mining Cars



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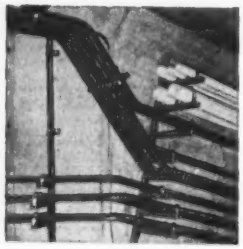

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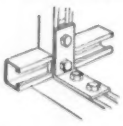

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Philippines *(Continued)*

production value of $170,000. This compared with 11,300 tons milled in January valued at $185,000. The company's directors announced that results from a record-breaking 19,184 ft. of development work in 1952 were disappointing. Ore reserves accordingly were depleted during the year.

★During 1952, the Haussermann mines, **Benguet Consolidated** and **Balatoc,** milled nearly 1-million tons of ore, recovering 196,100 oz. of gold, with an average value of about 0.2 oz. per ton. The price of gold received during the year averaged $50 per oz., a substantial decline from the average price received in 1951. Total operating costs continued to advance in 1952 and averaged $8.80 per ton before depreciation, depletion, and income taxes.

★**Baguio Gold Mining Co.** reports that 21,443 oz. of gold were produced in 1952 and sold for a gross value of $1,071,500. Milling efficiency averaged 90.6% throughout the year. Current ore reserves are estimated to be 103,383 tons. Operations during 1952 showed a loss of $9,300. The company plans an intensive development campaign in 1953.

★**United Paracale Mining Co.** milled 49,864 tons during the year, recovering 15,488 oz. gold, 23,895 oz. silver, 156,277 lb. copper and 155,161 lb. lead. Gross value was $856,000. At the end of the year, ore reserves totaled 227,412 tons averaging 0.468 oz. gold per ton. Loss of the Baluarte and San Antonio areas as a result of flooding last year caused a write-off of 137,000 tons, but this was more than compensated by successful development on the Longos section.

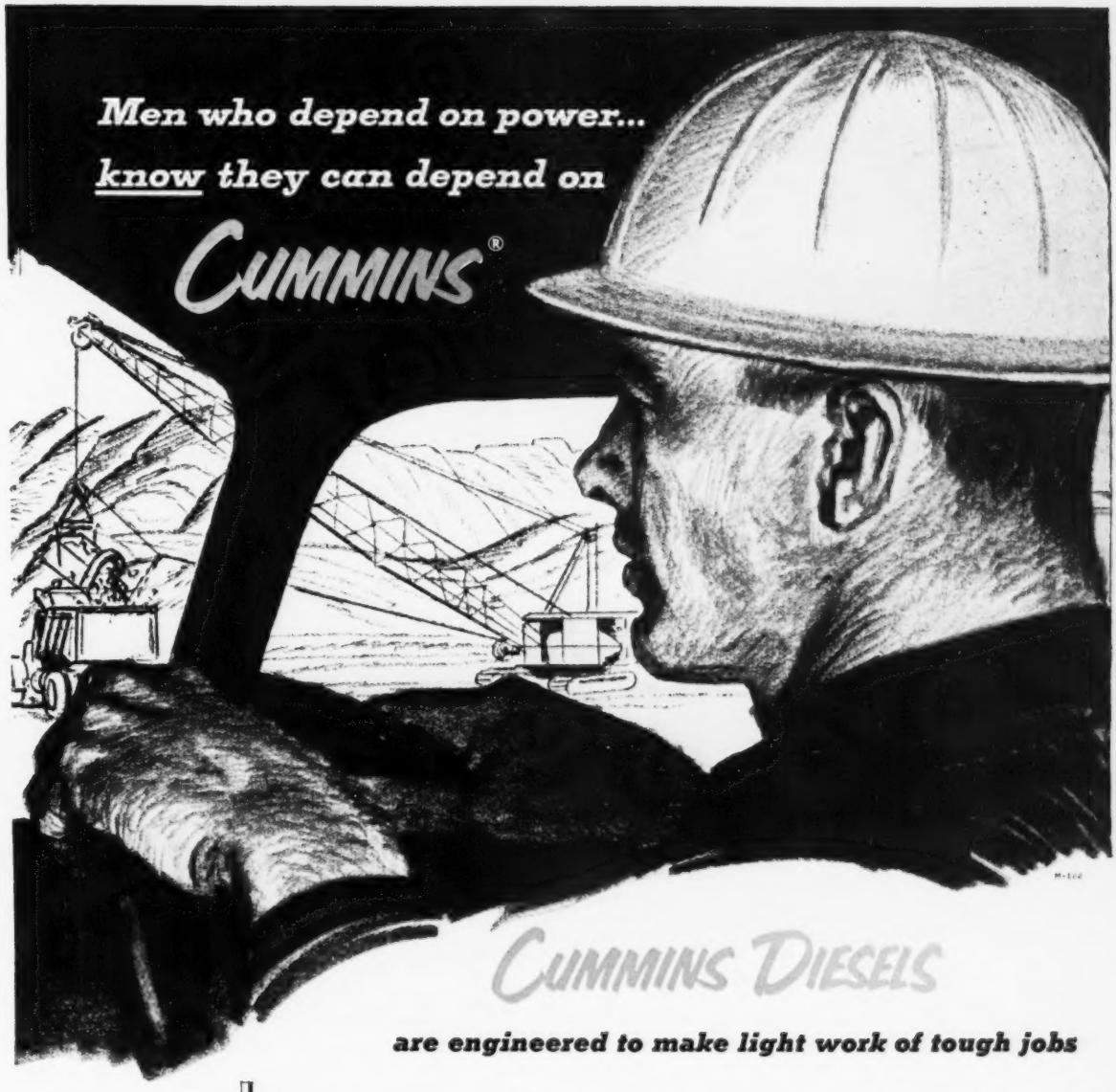
CORRECTION

In the April issue of *E&MJ*, a table appeared on page 166 comparing the value of Philippine gold production for January 1953 with that for January 1952. The value was given at $35 per oz. for both months. This was in error because the article points out that the open-market value for gold in January 1952 was 117 pesos, whereas in January 1953, the open-market value averaged only 109 pesos.

IN AUSTRALIA

★**The drop in world prices** of lead and zinc, Australia's main metals for export, has created certain uneasiness in Australia, but the industry is still able to produce at a profit and the drop in prices will not affect present operations or the long-term expansion plans.

This year's profits of producing companies will probably be smaller and many dividends will be lower, but



are engineered to make light work of tough jobs

***Leaders** in rugged, lightweight high-speed diesel power!*

Why do so many mine operators count on Cummins for dependable power in toughest going?

You'll find part of the answer in the special kind of versatility that belongs to Cummins Diesels alone. It's versatility that goes beyond the handling of all kinds of jobs. It's actually an ability to meet every power requirement that any situation demands . . . to save on fuel, do more work per dollar, whether the call is for continuous power or stop-and-go operation over a wide and flexible speed range.

Yes, you can count on a (60-600 h.p.) Cummins Diesel for dynamic versatility in every job—performance that stems from an exclusive fuel system and precision engineering. See your Cummins dealer for all the facts. He's a diesel specialist . . . ready to help solve your power problems.

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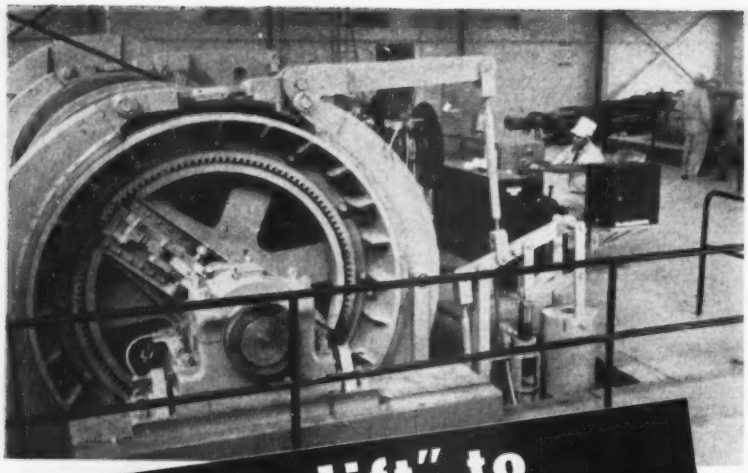
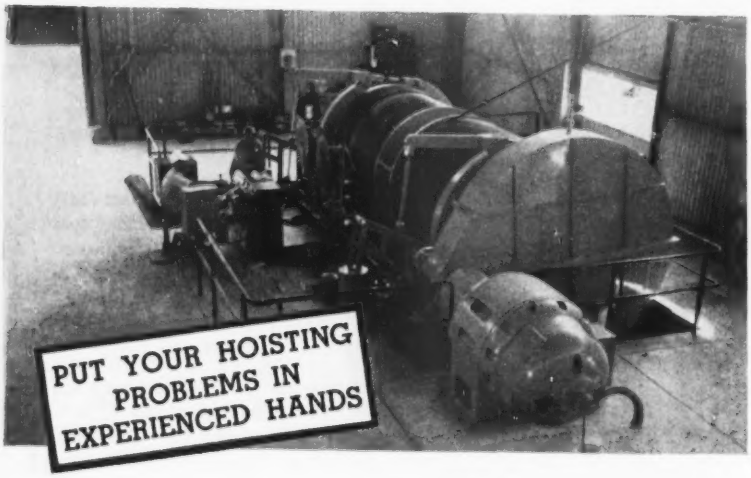


Give "a lift" to mine efficiency!

Typical of hoists designed and manufactured by Stearns-Roger *for specific requirements* is this twin drum, 22,000 lb. electric hoist installed in a large Western mine.

Each drum is cast Meehanite®...84" diameter with 78" face, winding 1,200 feet of 1⅜" cable. One drum is fixed and the other clutched. Brakes are set by gravity and release hydraulically. Drums are fitted on 10" shafts with three self-aligning bearings, with two such bearings serving the 6" pinion shaft.

Rating is 22,000 lbs. rope pull at 1,000 ft. per minute rope speed.



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Australia *(Continued)*

both domestic and overseas investors are still showing considerable interest in Australia metal industries. Australia now earns at least $115-million a year from her exported metals.

While lead and zinc continue on the top of the list, more and more interest is shown in the potential export earning power of uranium and rare metals. Titanium and manganese needs are stimulating Australian operations and new activities should be soon reflected in greater exports. In the Northern Territory, a subsidiary of Consolidated Zinc, Territory Enterprises Pty., Ltd., is increasing the tempo of work on the rich uranium fields at Rum Jungle.

Mechanization of Australian mines and introduction of more modern methods of operation are considered to be the most important problems facing the industry Down Under, and proposals have been renewed to send a productivity mission to the United States. The government has again pointed out that it is prepared to support all efforts to increase production and to grant hard currency for necessary purchases of modern equipment not obtainable from other sources.

In the meantime new important discoveries have been reported. Near Tenterfield, in the northern New South Wales, a helicopter search led to a discovery of new uranium deposits and a ground search would be now instituted.

★**The Australian Government** is preparing to relinquish its strict control over exports of zinc. The so-called home consumption price will be equal to world prices and export control over this mineral would be removed. Last year over 30,000 tons of refined zinc have been exported in addition to some 150,000 tons of cencentrates.

★**Exports of Australian copper** to the United States have been started in the last few weeks as a result of a sudden surplus of copper in Australia. There was an acute shortage of copper, but the start of Mt. Isa's production on a large scale has enabled first shipments of copper to be sent to the States. Imports of copper from Rhodesia will now be stopped, and experts estimate that an Australian export trade could be established at some 6,000 to 10,000 tons a year.

★**In Canberra it is expected** that Australian exports of metals would be considerably enlarged in the next 18 months. Several Australian producers are now negotiating the sale of their output to foreign interests, including some U. S. firms.

★**The only metal industry suffering** now from recession is wolfram exploitation. Severe drop in prices brought several mines to a standstill and employees have been dismissed in Northern Territory's main wolfram fields at Hatches Creek.

★**Canadian investors** are showing interest in diamond drilling for gold at

132

men who know cranes know you can depend on BROWNHOIST

Besides being a powerful, efficient unit for regular materials handling work, Brownhoist Cranes are unusually versatile. For example, on the great Mesabi Range where this Brownhoist Crane is loading ore, other Brownhoist Cranes are laying and ballasting track, rerailing cars and doing dozens of other tough production and service jobs. Brownhoist Cranes perform equally well as switch engines because they are built with a specially designed travel generator, motor and axle reduction unit for high tractive power and rapid acceleration. In railroads, steel mills and manufacturing plants, this versatility can save production time and money. So can other specially engineered Brownhoist features like the patented Monitor Type Cab and Clear Vision Boom, the Dynamatic Clutch and the Friction Clutch Boom Hoist. Brownhoist Cranes are strong and rugged for continuous heavy duty operation and long life. They are built in capacities from 25 to 80 tons for virtually every materials handling operation. It will pay you to consult your nearest Brownhoist representative or write today for complete information.

BROWNHOIST BUILDS BETTER CRANES

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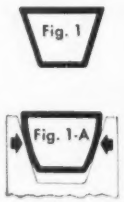
Gates V-Belts Wear Longer-

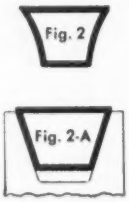
The CONCAVE SIDE (U.S. Patent No. 1813698) is what gives the Extra Wear!

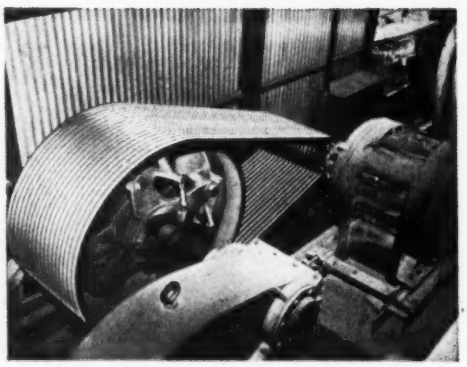
Take any *straight-sided* V-Belt (Fig. 1) and bend it as it bends in going around its pulley. You will clearly see its sides *bulge out* (Fig. 1-A). These sides therefore press *unevenly* against the V-pulley and this causes extra wear at the point shown by arrows (Fig. 1-A).



Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2).

You will see the precisely engineered CONCAVE SIDES fill out to an exact fit in the sheave-groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means longer belt *life* and *lower* belt *costs* for you.





Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

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Australia *(Continued)*

Tennant's Creek in the Northern Territory.

★**Victorian Antimony Mines Ltd., is** nearing the production stage at its Costerfield mine and has now acquired an option over Australia's leading antimony producing mine in the New England district of New South Wales. Ore in the new mine has a proven metal value of 40% antimony over a width of 3 ft. in a shoot over 250 ft. long. At Costerfield, last preparations are being made to start production and trial runs of the treatment plant have been nearly concluded. The treatment plant has been adapted to a wider range of antimony ores now available to the company. Commercial production is expected to start in July, 1953.

★**Important concessions** to private uranium prospectors have been announced by the Australian authorities as a part of a plan to develop the Australian uranium industry and at the same time to provide more opportunity for private enterprise. Ultimately it is hoped to transfer to private industry nearly all the stages of work on uranium and atomic power but the possible return to power of the Labor Government would obviously reverse the position.

Several thousand men will be employed in Australia's Northern Territory on uranium work although the peak of employment is unlikely to be reached before 1958.

IN ASIA

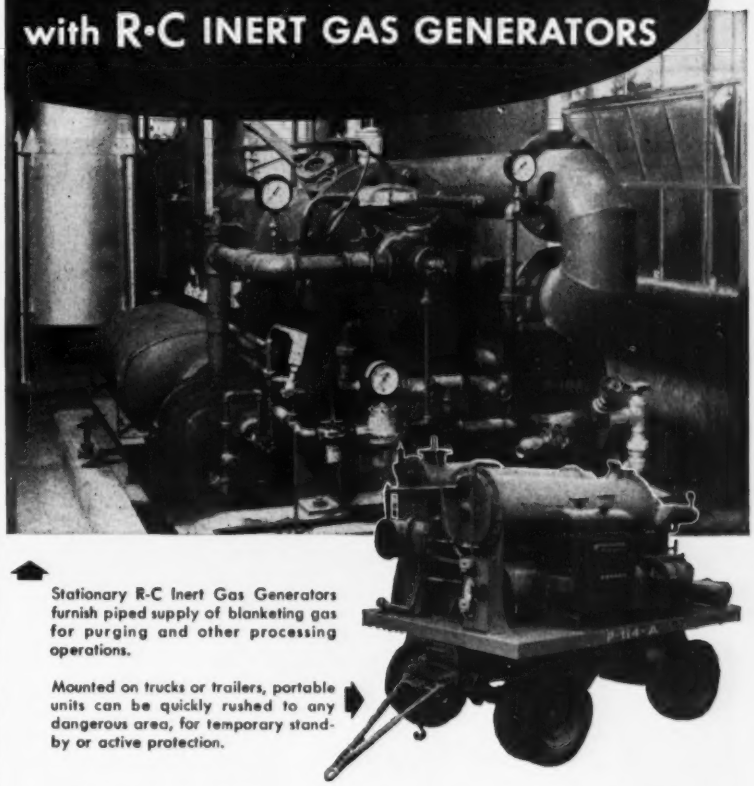
★Japan's Ministry of International Trade and Industry estimates that Japan will produce about **300 tons of titanium in 1953.** Largest producer of the metal is Osaka Titanium which now operates a 9-ton-per-month pilot plant. This plant will be enlarged to produce 50 tons per month by the end of this year. Three other firms now building titanium plants are: Japan Electrical Metallurgy, Japan Soda, and Mitsui Metal Manufacturing. Other Japanese news reports state that firms now engaged in titanium manufacture number 10. Titanium producers will set up a technical committee to study improved technology and production methods, and a Titanium Industry Conference will be organized to invite discussion of titanium production by Japanese and foreign metallurgists.

★**Japan's metal mining index** has jumped from 100 for 1949 to 166.3 for February, 1953. Nonmetallic mining increased to 210.3 for February 1953 as compared with the 1949 base.

★**According to the Mukden radio,** large-scale prospecting and drilling for iron ore is under way in Penki, Northeast China. Preliminary findings indicate that rich deposits of iron

(Continued on page 193)

REDUCE **EXPLOSION** RISKS
with R·C INERT GAS GENERATORS



Stationary R-C Inert Gas Generators furnish piped supply of blanketing gas for purging and other processing operations.

Mounted on trucks or trailers, portable units can be quickly rushed to any dangerous area, for temporary stand-by or active protection.

Where materials or processes may cause explosion-produced fires, such hazards can be greatly lessened by stand-by R-C Inert Gas Generators.

From stationary or portable units, a continuing flow of inert gas will blanket dangerous areas or can be used for purging explosive gas or liquid lines. Using either oil or gas as fuel, they operate at very low cost. Frequently, the comparatively small investment can be absorbed by more favorable insurance rates.

Units are available in capacities from 1,000 cfh to 50,000 cfh, with characteristics to match specific requirements. Write for details on how your fire and explosion risks may be reduced with R-C Inert Gas Generators . . . built by the specialists in equipment to handle gas and air.

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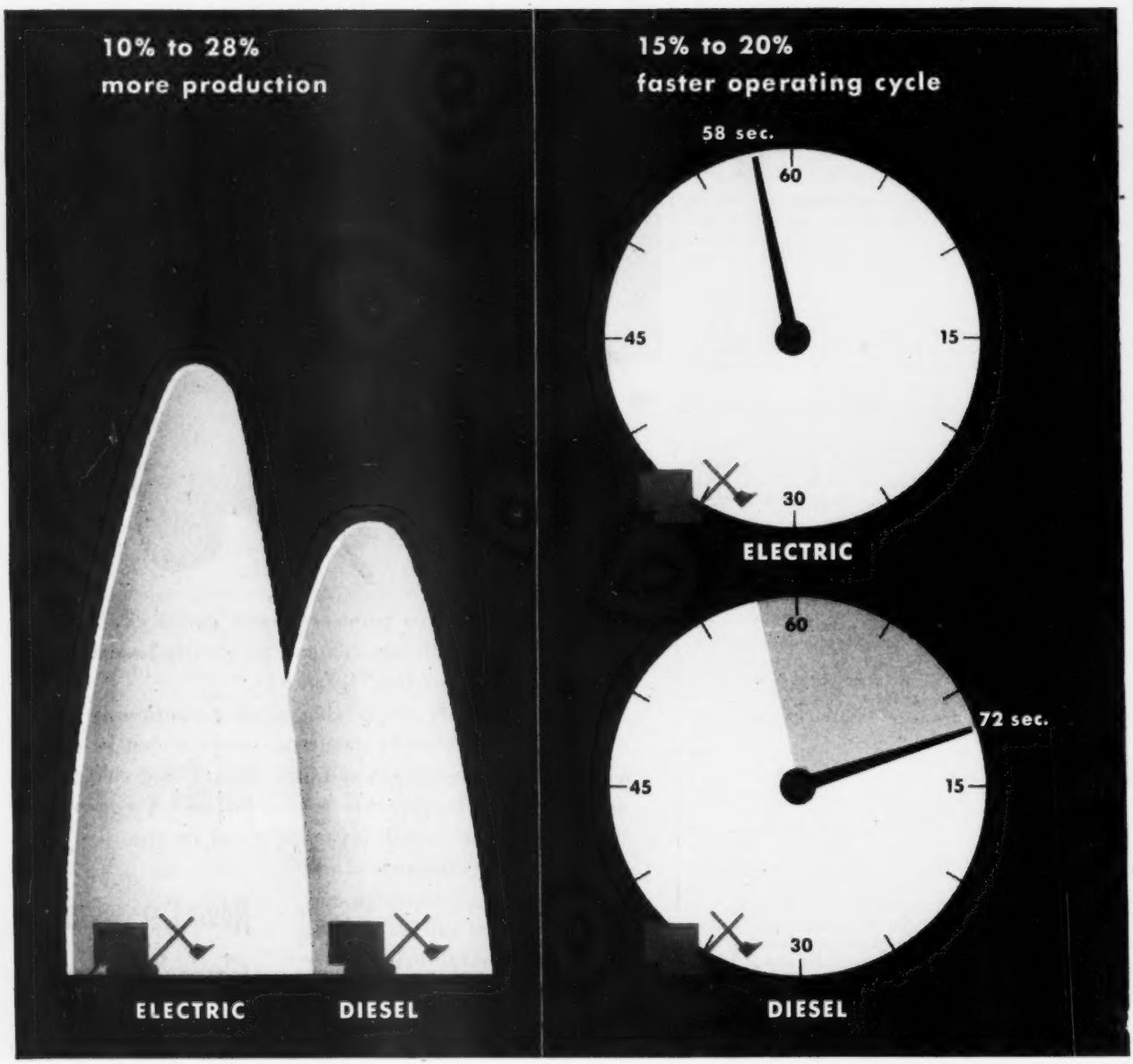
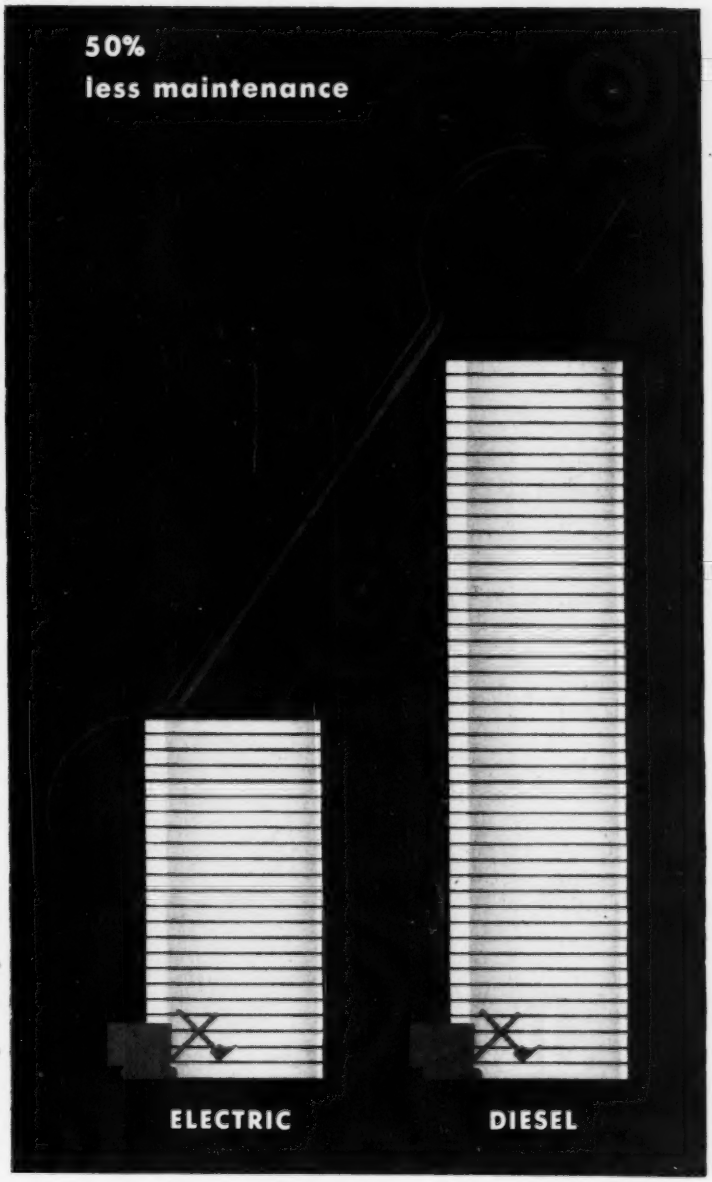


10% to 28% more production—One shovel manufacturer studied both electric and diesel powered, 13 cubic yard units working under equal conditions. Results showed that the all-electric shovel was about 28% more productive. It's been proved that all-electric shovels and draglines will outproduce any other type by at least 10% in any size range from 2½ cubic yards up.

15% to 20% faster operating cycle—One reason for such fast performance is that all-electric units, unencumbered by mechanical brakes and slipping clutches, have an infinitely faster transmission of power. Precise speed and power control make it possible to design electric machines for much higher operating speeds than all other types of shovels and draglines.

Have you considered all the advantages of electric shovel operations?



50% less maintenance—One large shovel manufacturer has estimated that your maintenance of power equipment alone would be approximately 50% less if you switch to an electric shovel or dragline operation. Your savings in maintenance would amount to about $150 to $175 per month, based upon a 40-hour week, single-shift operation with a medium-sized machine.

Two leading shovel manufacturers, who build both electric and diesel powered units, say you can't beat electric drives for shovel performance. They agree that all-electric (Ward-Leonard type) shovels and draglines, such as Westinghouse-equipped machines, are the most productive types for any operation. These figures show why!

All-electric shovels and draglines give you:

10% to 28% more production
15% to 20% faster operating cycle
50% less maintenance

What about initial costs? All-electric shovels and draglines have a higher initial cost in smaller sizes, but actually cost less in the larger machines. However, even in the smaller sizes, the productive life of an all-electric shovel or dragline is roughly *double* that of comparable engine-driven unit.

Save money . . . Call Westinghouse before you buy!

If you're considering a new shovel or dragline, call your Westinghouse representative before you buy. He'll show you how Westinghouse-equipped shovels and draglines can give you these and other dollar-saving benefits. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94995

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It's easy to see why more and more progressive equipment owners have turned to J&L heat-treated Jalloy to do a dollar-saving job for them. If you're responsible for the economical operation of earth moving or handling equipment you'll want complete information on this modern mining and quarrying steel. Just fill in the coupon for a free copy of our Jalloy Booklet—"For Longer Wear . . . Less Repair."

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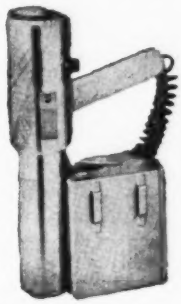

Model 111 (pictured above) . . $495.00
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SPECIAL LONG PROBE SCINTILLATION AND GEIGER COUNTERS FOR DRILL HOLES

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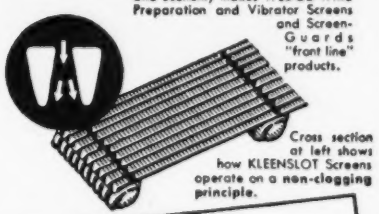

Cross section at left shows how KLEENSLOT Screens operate on a non-clogging principle.

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Asia *(Continued)*

ore are present, and that open-pit mining methods will be possible. The Penki Coal and Iron Co. has organized a large exploration program, which is expected to complete work by August, 1953.

★**The Ooregum mine** in the Kolar Goldfield, South India, has been running at a loss of about £175 daily and will shut down. Closure will affect about 3,500 miners. In 1952 Ooregum produced 34,681 oz. of gold, or about 75% of India's total gold production.

IN EUROPE

★**French aluminum industries,** though now experiencing selling difficulties, expect that the long-term demand will be in balance with supply, according to Mr. H. Piaton, chairman of the French aluminum and chemical concern, Pechiney. He estimated that world consumption outside of Communist countries would total 3-million tons in 1962, by which time world output would be stepped up to this figure.

The French project in New Guinea, where a large deposit of medium grade bauxite was discovered, has made headway. It is now apparent that a dam would have to be built to supply power to process the ore into aluminum, but whether this production would be economically competitive is still a matter of question.

Reporting on modernization and development within the company, Mr. Piaton said that the 100,000-amp. vats now used in the Saint-Jean plant place France on top in the race for technological superiority. The formula for building these vats was sold to Aluminum Co. of America and Anaconda on a dollar-royalty basis.

★**Apparent consumption of copper** in France for 1952 was 154,000 tons. Imports totaled 150,000 tons, 55% of which came from the Belgian Congo. Negotiations took place recently to acquire copper from Chile but broke down because of French unwillingness to pay high prices asked.

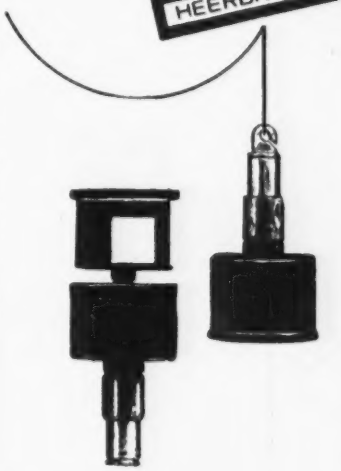
Output of lead concentrates in France and French North Africa totaled 180,000 tons (120,000 tons of contained metal). Home consumption was 90,700 tons, which made France a net exporter of lead.

Zinc consumption for 1952 totaled 120,000 tons. French North African production was 113,000 tons of concentrates containing 60,000 tons of zinc.

★**A serious production crisis** leading to the arrest of numerous executives has developed in the Mansfield copper mines in the Soviet Zone of Germany. For years output has been falling, and in 1952 the mines failed to reach production targets. Geologists, engineers and even the miners themselves became increasingly convinced that the

FOR YOUR WATCH CHAIN

WILD HEERBRUGG



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The Optical Square is a handy tool for checking on location, for alignment, and for laying out right angles. Speedily used as a hand level, it has an accuracy in leveling of 1 inch in 200 feet. The instrument is available in single and double prisms.

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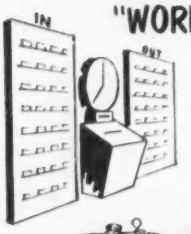

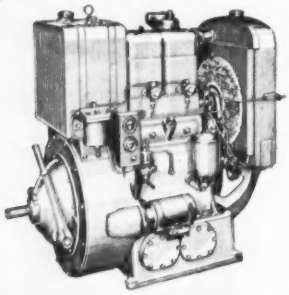

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No "9 to 5" routine for Nordberg "4FS" series Diesel engines . . . they're built to stay on the job around the clock—day in and day out. Using sturdy, heavy duty construction throughout, these conservatively rated units are your best buy for the toughest kind of power jobs . . . in construction, oil field, irrigation, power plants, marine service and scores of other power requirements.

Built in 1, 2 and 3-cylinder models, these reliable, low cost Nordberg Diesels are available as power units in sizes from 10 to 45 hp; as generator sets from 6 to 30 kw; and as pumping units in capacities from 200 to 3,000 gpm at 15 to 240 ft. total head.

And remember—Nordberg Diesels are backed by over 60 years' experience in the design and construction of heavy duty machinery for the world's industries. Clip the coupon for full details.

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Send catalog covering Nordberg Type 4FS Diesels. I am interested in a unit for the following service: EM

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Europe *(Continued)*

deposits were reaching the end of their productive possibilities. Then Soviet Russian geologists and mine experts were called in to advise, and it was decided to step up production of lead and zinc which were more abundant than copper.

The Soviet experts failed to run things any better, so the authorities resorted to drastic action to revive flagging morale and boost output. The first step was a major purge. Technical personnel, who had spent most of their lives working in the Mansfield pits, were removed and some were arrested.

Next, Communist shock workers were called in to set the pace. But owing to difficult mining conditions, output targets had to be lowered. In one pit the stint per man-shift went down from 0.946 tons in Dec. 1951 to 0.897 tons at the end of 1952. Shock workers and Communist agitators started campaigning for higher stints. Failure of voluntary appeals to increase production was followed by appeal to the Soviet Zone government for help, and it is now certain that the authorities will force a 10% increase on the already hard-worked miners. If this fails, the Communist authorities will probably dodge defeat by saying that the Mansfield production slump is due to "sabotage by agents of American imperialism"—just as they did in a similar situation in the East German coal mines.

★**Italian pyrite production** in 1952 was 1,126,311 metric tons, the highest figure recorded. 1951 output was 900,900 metric tons.

★**The British Ministry of Supply** is asking Parliament for a further £2.5-million sterling to finance uranium production in South Africa and Australia. This is in addition to the original estimate of £3.5-million.

★**The Italian Ministry of Foreign Trade** has decided to allow the exportation of 7,300 tons of primary aluminum to dollar area countries during the April-December period of 1953.

Scholarships To Attract More Mining Students

PICKANDS, MATHER & CO. has established 20 new scholarships at the Michigan College of Mining & Technology available to high-school graduates in Michigan, Wisconsin and Minnesota. The scholarships are valued at $250 to $1,750 and provide for college study in mining engineering. An effort is being made to prepare for a serious shortage of qualified mining engineers which is expected to develop by 1955. Among other companies which are also taking similar action, the Copper Range Co. has established a four-year scholarship at the college that is valued at $2,000.

How to keep informed on the "with what" part of your business

AT YOUR FINGER TIPS, issue after issue, is one of your richest veins of job information—advertising. You might call it the "with what" type—which dovetails the "how" of the editorial pages. Easy to read, talking your language, geared specifically to the betterment of your business, this is the kind of practical data which may well help you do a job quicker, better—save your company money.

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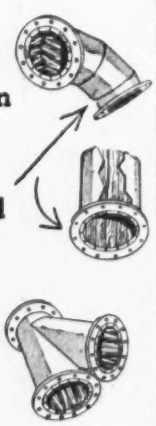

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Two Smelter Experts Exchange Letters on A Tough Waste-Heat Problem

Dear Mr. Ramsey:

I have just glanced through your excellent article on White Pine, which I will read carefully later on. However, I am especially interested in the smelter because of trouble we have had at Paipote with flue-dust in the waste heat boilers.

One thing that surprises me is that there is only one waste-heat boiler. Nowadays all furnaces have two, so that, when repairs have to be made to one of the boilers, the whole of the gases are diverted to the other boiler. Of course, when operating with only one boiler, the capacity of the furnace has to be cut down to about 70-75% of normal, because, as a rule, one boiler cannot take the volume of gases meant for two boilers. It may be that the waste heat boilers of the new smelters at Morenci, Ajo and Chuquicamata, are designed so that they will be able to take the whole volume of gases with the furnace operating at full capacity. It is a question of design (baffles, spacing of tubes, etc.). Of course, one boiler will not be able to produce the same quantity of steam as the two boilers, which are made, exactly alike, but the main thing in a smelter is to be able to smelt at maximum capacity, even if you are only getting 60 to 70% of the total steam when one boiler is down for repairs.

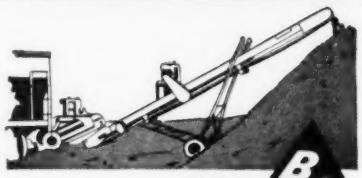
No Auxiliary Stack?

Another feature of the design that surprises me, is that having only one boiler, they are not building a by-pass with an auxiliary stack to vent the gases when the boiler has to be shut down for repairs. All waste-heat boilers have to be shut down occasionally for repairs and cleaning, no matter how much care is given them. Another reason for having a by-pass in lieu of two boilers in this particular instance is given in your article when it says "is that with only one furnace in the smelter it must be kept going indefinitely. This is possible only with the suspended arch of magnesite brick."

The only other copper smelter which I know of with one furnace and one waste-heat boiler, is that of Roan Antelope, but this one has a by-pass stack. Apropos of this, Wraith says in page 317 of "Copper Metallurgy" 1933, vol. of AIME: "When the waste-heat boiler has to be shut down for cleaning or for repairs, the furnace gas can be directed into a by-pass stack which is situated at the end side of the furnace. This is a firebrick stack, 6 ft. square by 75 ft. high. Water-cooled dampers situated in the flues provide means for switching the furnace gases to either the boilers or the by-pass stack." As the practice of constructing a furnace with only one

(*Continued on page 198*)

one MAN



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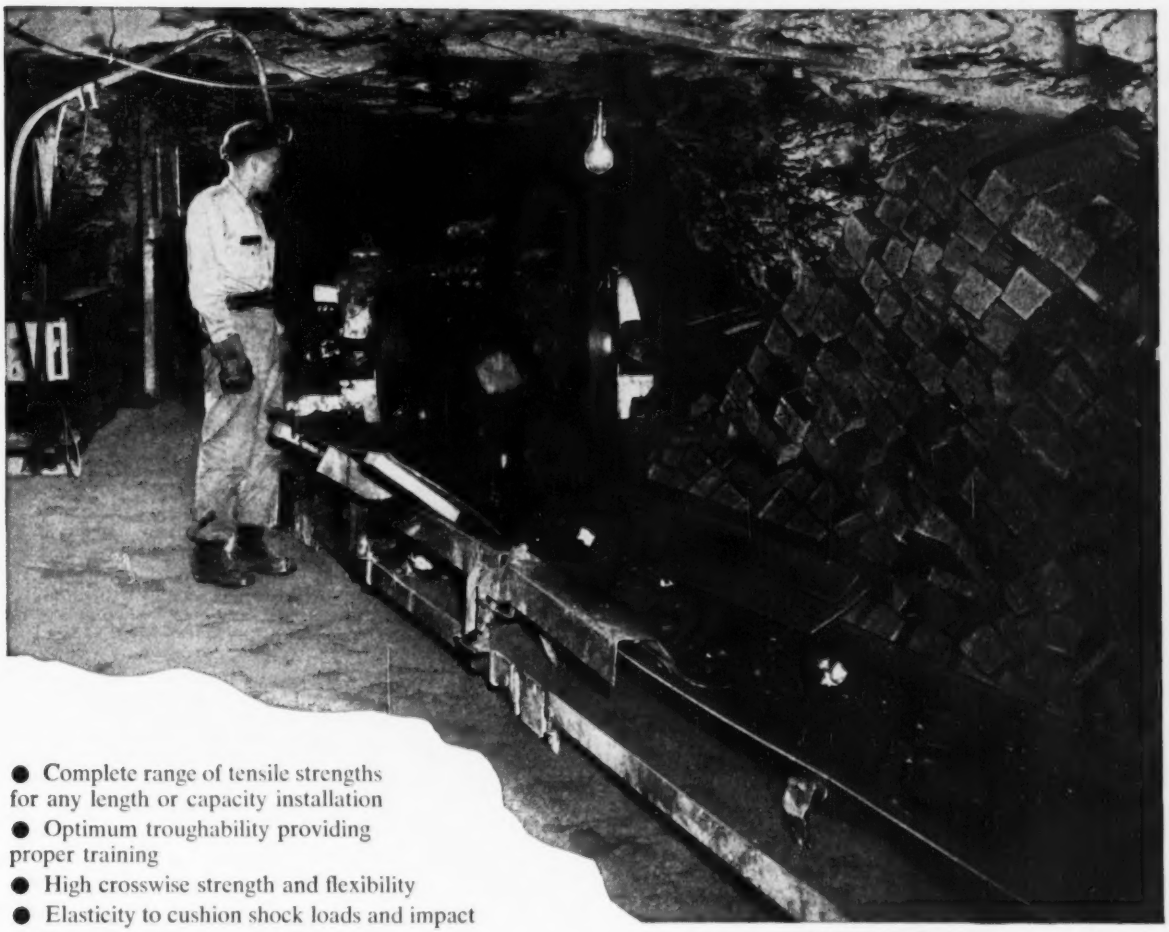

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TRANSFER POINT between two 30" 4 ply Style XN U.S. Giant Conveyor Belts. Style XN is a patented construction of cotton and Nylon carcass embodying greater strength and crosswise flexibility at no increase in weight over conventional type belts. More than 15,000 ft. of this belting is operating in this mine.

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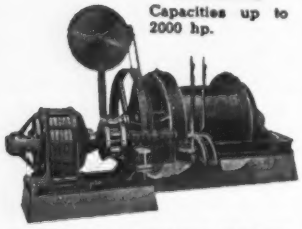

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boiler is unusual and still more unusual, when there is only one boiler, not to build a by-pass stack, I have thought that the designers of the plant, who are very experienced engineers, must have had some powerful reasons for doing this which reasons are not apparent in the article.

It occurs to me that perhaps as the cost of a by-pass is quite appreciable, the designers have worked out that it is cheaper to shut down the furnace when the boiler has to be cleaned or tubes changed than to build the by-pass; but the trouble is that sometimes a tube goes without warning and the furnace gas had to be taken from the boiler quickly, while the furnace cannot be cooled and left full of matte and slag. In the smelters I have worked, it has been customary to empty the reverbs when the fire is to be taken off long enough to cool the charge. Another possibility I have thought of is that there might not be a great difference in cost between two boilers (each to take half the gases) and only one boiler and a by-pass stack.

With regard to the type and make of the boiler that is going to be installed, I suppose it will be either Babcock & Wilcox or Combustion Engineering and that it will have a water-wall chamber before the boiler proper to cool the gases before they hit the closely spaced tubes of the conventional boiler. Such water-wall chambers are installed at Hurley, Morenci, Ajo and Chuquicamata and their object is to cool the gases down from about 2,200 deg. F. to 1,708 deg. F. before they get into the conventional boiler. With regard to this matter, *E&MJ* under Nonferrous Metallurgy, Feb., 1952, page 131, said: Installation of new waste-heat boilers at Noranda: Have the following principles of design:

First, there are no baffles and the gas flow is horizontal at low velocity to minimize the sand-blast effect of the dust on the boiler tubes; second, a simplified arrangement of tubes and drums facilitates repairs and third, improved soot blowing eliminates the necessity of hand lancing. I hope they have or will succeed, for hand lancing is nasty work. In the *Mining Engineering* corresponding to December, 1952, which deals with the new Chuqui sulphide plant, B. F. Kock, chief steam engineer for Anaconda, makes some very pertinent remarks about flue dust in boilers, how to prevent it from getting there, and the easiest way of getting rid of it if it does get there.

FERNANDO BENITEZ
Santiago, Chile

. . . and here is the reply

Mr. Benitez's letter was forwarded to R. C. Wilson, smelter superintendent of White Pine Copper Co., who kindly offered the following explanations to Mr. Benitez's questions:

Dear Mr. Benitez:

Mr. R. H. Ramsey has sent me your penetrating analysis of the White Pine waste heat boiler.

You are absolutely correct in saying that a furnace with two boilers can operate through one boiler at 70-75% of capacity while the other boiler is down for repair. The boiler designed by Babcock & Wilcox for White Pine, is large enough to handle all of the waste gases from the furnace with a draft loss of only 0.2 in. w.g. This small draft loss is made possible by the streamlined uptake, water wall expansion chambers, complete absence of baffles, and the low position of the boiler top which minimizes the stack effect within the boiler and eliminates smoking through the top. With this arrangement, the gases will pass through the boiler at a very low velocity, and it is our belief that tube failure due to abrasion will be eliminated.

Tube failure due to corrosion will be kept to a minimum, or perhaps eliminated, because the boiler will produce steam at 885 lb. pressure and 920 deg. F. at superheater outlet. At this temperature, the tubes will be hot enough to prevent the condensation of moisture from the furnace gases. As you know, some waste heat boilers operating at 150 lb. and about 370 deg. F. are plagued with corrosion at the cold end of the tubes where acid bearing moisture can condense.

For the above reasons, it is believed that the boiler campaign will be nearly the same duration as the furnace campaign. In other words, when the boiler needs a major repair it can be anticipated and other major repair jobs throughout the smelter can be carried out at the same time, thus justifying a complete planned shutdown of the smelter. The mine and mill can continue to operate since we have adequate storage and reclaiming facilities.

There is, however, some possibility of freak accidents where a tube will burst for no apparent reason. This kind of emergency will be dealt with as follows:

A water cooled damper at the uptake will isolate the boiler from the furnace. The boiler will be drained and the broken tube will be removed and the holes plugged off. After the boiler is refilled, operations will begin again with one less tube in service. This repair should take less than sixteen hours. During the repair job, the furnace bath can be kept molten with a low fire on the burners.

With modern boiler construction, unexplained tube failures will be extremely rare. Consequently, we have chosen not to build a by-pass flue with its disadvantages of added capital

(*Continued on page 200*)

You can tell by the **PERFORMANCE..**

sure they're "Eucs"!

Wherever they're put to work, "Eucs" do the kind of a job that makes them the preferred equipment for moving earth, ore, rock and coal in off-the-highway service.

Big payloads, fast travel speeds and high job availability add up to more loads per hour and more profit per load. Whatever the job . . . building highways, dams, levees, airports . . . working in mines, quarries or on industrial projects, you can depend on "Eucs" for low cost hauling.

If you own "Eucs" you're already benefiting from their production and profit advantages. If you know them only by reputation, we suggest you get performance facts and figures from your Euclid distributor.

Euclid Scraper—15.5 cu. yds. struck, 21 cu. yds. heaped at 1:1 slope . . . 275 h.p. engine . . . top speed, loaded, 28.2 m.p.h.

Bottom-Dump Euclids—13 to 25 cu. yds. . . . . 190 to 300 h.p. . . . . top speeds loaded to 34.4 m.p.h.

Rear-Dump "Eucs"—10 to 34 tons . . . 125 to 400 h.p. . . . spring mounted or semi-rigid drive axles . . . top speeds loaded to 36.3 m.p.h.

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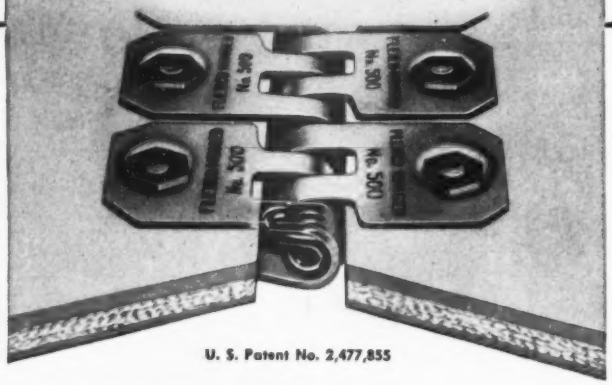

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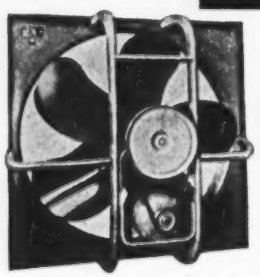

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STEP-UP OUTPUT and quality of workmanship, reduce industrial accidents and employee fatigue with proper ventilating and cooling equipment. CHELSEA Fans remove excessive heat, fumes, dirt, dust and grit, also dead stale air. 30 models, in over 200 sizes, are available, and each fan or blower is especially engineered and tested for its recommended application. All ratings are certified by P.F.M.A. test methods to insure proper performance. Check on your ventilating requirements, now.

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cost, high maintenance, flue dust handling, congesting the area, etc.

As far as the handling of boiler dust is concerned, we are hoping that the automatic dust blowers on the boiler will keep the tubes clean. Hand lance ports have been provided for use if hand lancing is necessary. The water wall section should keep slagging of the tubes to a minimum and produce a granular dust in that section. We plan to move the dust from the ash hoppers by means of a screw conveyor, and then dampen the dust in a pug mill located at the discharge end of the conveyor.

If we have much of a slag problem in the boiler, some other means of handling the dust will have to be developed. We hesitate to predict just what this will be until after operations begin and we can see just what the conditions are.

R. C. WILSON
Smelter Superintendent
White Pine Copper Co.

From Company Reports

American Smelting & Refining

Production of major metals at refineries of the American Smelting & Refining Co. in 1951 and 1952, according to the annual report to stockholders:

	1951	1952
Gold, oz.	1.196,096	1,099,698
Silver, oz.	72,370,258	75,996,940
Lead, tons	503,851	537,331
Copper, tons	414,226	408,402
Zinc, tons	149,231	158,675

Note: Production at refineries is derived from products treated on toll for account of others, purchased materials, and products of owned, partly owned or leased mines.

The zinc content of shipments to others of zinc concentrates, zinc dust, zinc fume and slag totaled 154,441 tons in 1952, against 116,984 tons in 1951.

During 1952, the report reveals, drilling of the Toquepala copper deposit in Peru was completed. An ore reserve in excess of 400-million tons has been proved, with an average assay slightly greater than 1%. Engineering and cost estimates are well advanced, based on producing 100,000 tons of blister annually for the first 100 years of operation; 85,000 tons annually for the following 20 years; and an average of 68,000 tons annually for the remaining estimated 16-year life of the operation. Capital required on the project was estimated at $160-million.

Production of acid grade fluorspar at a mill being erected at Agujita, Mex., will begin during the second quarter of 1953. Output will total around 2,000 tons a month.

This Month in Mining

(*Continued on page 202*)

PAYLOADER *WORKS ANYWHERE*

4-WHEEL DRIVE GIVES TRACTION, MOBILITY AND VERSATILITY!

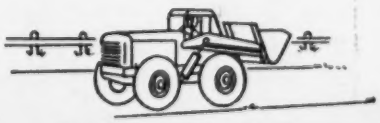
Load! Dig! Backfill! Carry! Spread! Lift! Pull! Push! — all these operations are everyday tasks for big versatile "PAYLOADERS" — makes them valuable for small or large mines — in the pit, at plants, at tipples, in yards.

These "PAYLOADERS" feature large pneumatic tires, 4-wheel-drive, proper weight distribution and power-boosted steer. Other outstanding advantages are full, double-acting hydraulic bucket control and four speeds in *both* directions. They will travel in either direction from a slow, powerful crawl up to 20 miles per hour. Sales *and* Service are available from 200 "PAYLOADER" Distributors in the U. S. and Canada. See yours for full details or write The Frank G. Hough Co., 726 Sunnyside Ave., Libertyville, Ill.

CATALOGS are available on any "PAYLOADER": 4-wheel-drive Models HM — 1½ cu. yd. and HR — 1 cu. yd.; rear-wheel drive Models HY — 1¼ yd., HF — ¾ yd., HE — ½ yd.; front-wheel-drive Models HAH — ½ yd., HA — 12 cu. ft.

Power-boosted steer for easy handling in sand and mud

Big tires and 4-wheel-drive for traction and flotation



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eliminate maintenance on chains, belts, sprockets, Universal drives, countershafts, etc.

EVERYTHING is contained INSIDE the pulley shell!

HERE'S a money-saving departure from conventional conveyor drives. A Cedarapids-Schrock *Motorized* Head Pulley is simply a new application of the long-proven gear reduction drive, with everything . . . electric motor, reduction gears and all moving parts . . . contained inside the drum, completely protected from grit, dirt and weather and with no outside parts or motors to service. 70% to 90% of conveyor trouble and downtime is saved by eliminating the exposed parts necessary with conventional pulley drives. In operation, the pulley shell rotates about the electric motor which is held stationary by a torque arm attached to the conveyor frame. The speed of the shell depends on the combined reduction ratio of the pinions and gears inside the shell. Compact, easy-to-install, job-proved Motorized Head Pulleys are available in sizes from 5 to 30 HP and in various widths.

Find out all the advantages of converting your belt conveyor or belt-bucket elevator installations to *motorized* efficiency before you need head pulley replacements. See your distributor today, or write for Bulletin MP-1.

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YUBA MANUFACTURING CO.
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This Month in Mining *(Continued)*

IUMMSW Will Seek Occupational Disease Fund

A GENERAL WAGE INCREASE of 15¢ an hour and an industry-financed occupational disease fund will be major demands of the International Union of Mine, Mill and Smelter Workers (Ind.) in bargaining this year with non-ferrous metal producers.

The union announced at its Denver headquarters March 30 that the demands were drawn up by 150 delegates from local unions at a three-day meeting. The union, which claims to represent 100,000 workers, said the present basic wage rates are $15.14 for underground miners and $13.25 for surface laborers.

Its major contracts are with Anaconda Copper Co., Kennecott Copper Co., American Smelting and Refining Co., and the Phelps-Dodge Copper Corp. Contracts with Anaconda, American Smelting, and Kennecott are open for bargaining on economic issues June 30. The Phelps-Dodge contract is open July 31 for bargaining on the same items.

The union said it would press for an employer-financed national occupational disease fund to be created by contributions of 1% an hour per worker. The proposed fund would be administered jointly by the union and industry. It would provide medical, hospitalization and rehabilitation care for what the union terms victims of occupational diseases in the industry. The union said the ailments were "especially silicosis and lung cancer."

Another demand will be sickness and accident benefits of $50 weekly starting with the second day for any disability whether "it is industrial or nonindustrial."

Establishment of a six-hour day and 30-hour week will be another union objective in the nonferrous metals industry. Other demands include premium pay for Saturday and Sunday work, increased shift differentials and an increase in pension benefits to a $125 minimum.

Wenden Stockpile Project Spurs Manganese Mining

MANGANESE STOCKPILING at Wenden, Ariz., has provided a healthy shot-in-the-arm for an ailing industry. Since the start of operations on Jan. 26 to mid-March, more than 40 mines in three states—Arizona, California, and Nevada—have been sending capacity loads of 400 short tons daily.

In the first five weeks of operation, an estimated 20,000 tons was received at the new sampling plant and purchase depot. Volume is so great A. Earl Johnson, manager of the Wenden plant, says a second shift of plant workers may become necessary. Most of the ore is coming from the Artillery Peaks district of Mohave County, 45 mi. north of the Wenden depot, and the largest deposit of low-grade manganese in North America. Other nearby sources are shipping ore by truck while Nevada and California mines are sending railroad carlots.

Huge New Brunswick Metal Find Sets Off Exploration Boom

(Continued from page 104)

which two levels are being opened. Looks like an assured, though modest, producer. Was established as a prospect long before the Brunswick discovery was made.

Kontiki Lead and Zinc Mines: Has well located ground some distance south of the Brunswick; will do prospecting work this summer, for which purpose $200,000 is available.

Landover Oils and Mines: Plans geophysical work on 10 claims adjoining New Larder on the west; is reported to have $100,000 in net current assets.

Macfie Explorations Ltd.: Joined with Teck-Hughes Gold Mines in acquiring a big low grade copper prospect on the shores of the Bay of Fundy. Will be drilling shortly.

Macho River Mines: Will be drilling shortly on a group adjoining New Larder. Has $30,000, but is being reorganized (name will be changed to Aumacho) to raise additional capital.

Maritimes Mining Corp.: With the property adjoining Brunswick on strike to the north, Maritimes had no problem in raising $600,000 for 600,000 shares. Geophysical work is already in progress.

Mayo Mines: Holds a property about midway between Brunswick and New Larder, and has $30,000 available for the search. No plans for work, however, have been announced.

Mining Corporation of Canada: Has a big concession area in the Rocky Brook-Millstream area, secured a year or more ago, and a large block of claims staked 50-50 with Noranda Mines this spring some 40 mi. west of the Bathurst area.

New Calumet Mines: For several years has held the Tetagouche property, an old-time long but narrow lead-zinc show, west of the Rocky Brook-Millstream area. It will probably remain idle, however, until metal prices improve.

New Formaque Mines: Has two groups; one in the Bathurst area and one some miles to the west. No work plans have been announced, but $50,000 is waiting their formation.

New Highridge Mining Co.: Another well regarded member of the

(Continued on page 206)

Mack comes in costs go down

It happens all the time. A truck user finds that heavy loads, rigorous weather, or tough terrain are proving too much for the trucks he owns. Frequent breakdowns . . . interrupted output . . . excessive repairs—all conspire to boost his costs and cut his profit margin. Then—if he's smart—he switches to Mack six-wheelers.

And that's where he gets a real eye-opener. Because even under the most adverse hauling conditions—hub-deep mud, slippery sand or pitted rock-strewn ground—his Mack six-wheelers keep the big loads moving on dependable, time-saving, cost-cutting schedule.

The reason why? It's found in Mack's Balanced Bogie with exclusive Power Divider that assures positive traction no matter how tough the going. Acting normally as a true differential the Mack Power Divider delivers torque between the two bogie axles in proportion to wheel traction, thus eliminating useless wheel slippage and spinning.

Mack's Balanced Bogie and Power Divider combine with numerous other outstanding Mack features to give you the power, strength, traction and easy maintenance you need to handle the biggest loads—with greater profit to you. Your nearest Mack branch or distributor will gladly give you all the facts.

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. . . outlast them all

Mack Trucks, Empire State Building, New York 1, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

In tough mining and quarry operations, owners who switch to Macks consistently find that these rugged trucks are the answer to more dependable service.

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A PANORAMA OF MINING'S GREATEST EXPANSION PROGRAM

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This authoritative, graphic, pictorial panorama of mining's greatest expansion program—which now adds up to an investment of more than $2-billion, over the next four to five years. This section will include:

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An up-to-date report on new mining projects, domestic and foreign, with the latest on taconite production.

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A heavily illustrated report on new mining and metallurgical projects, all over the world, with special emphasis on new techniques of mechanized mining and low-cost processing.

ALUMINUM

A graphic presentation of the tremendous growth in productive capacity.

Make plans now to hold on to your copy. Don't let it get away from you. You will want to refer to the editorial contents and advertisements in the July issue of E&MJ for years to come.

URANIUM, MOLYBDENUM, TITANIUM, COBALT, NICKEL

An exciting report on the new projects now beginning to expand the production of these vital metals. The variety and quantity of new, even revolutionary, techniques will be covered in considerable detail.

NONMETALLICS

Details of the growing nonmetallics field, highlighted by the new projects in potash, sulphur and phosphate rock.

A COMPREHENSIVE SURVEY of the great opportunities that lie ahead for metals like magnesium, titanium, cobalt, germanium and certain "new" nonmetallics.

AN AUTHORITATIVE ANALYSIS of the outlook over the next few years for the big production minerals – aluminum, iron ore, copper, lead, zinc and potash.

In addition, the July issue of E&MJ will contain the regular editorial features...

PLUS An outstanding display of advertisements prepared for you by the companies serving your industry. They will show you how their products are contributing or can contribute to your industry's greatest expansion program.

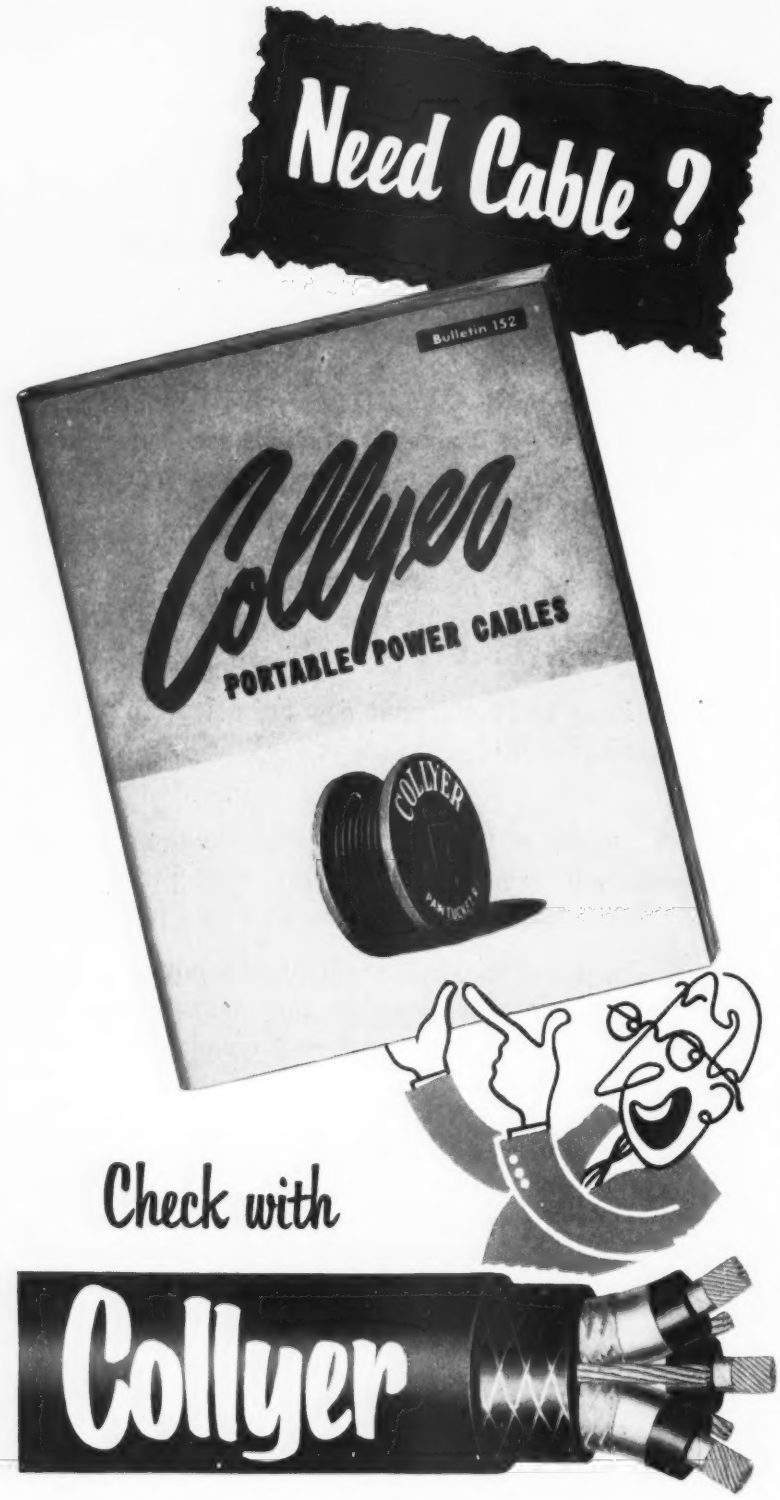
The July issue will give you for the first time a full perspective of the

★ impact of significant new technology in mining and metallurgical processes

★ impact of the important world-wide metal and nonmetallic mineral industry expansion programs

★ impact of important individual company expansion programs—*not only on your industry and its future but—more important—on you and your future.*

Many mining companies have indicated that they will want extra copies of this issue. If you want copies of E&MJ's July issue, "Mining's Greatest Era," write to the Editor of ENGINEERING AND MINING JOURNAL, 330 West 42nd Street, New York 36, New York, now and reserve your copies. Only a limited supply is available. Price per copy is $1.00 in United States, U.S. Possessions and Canada; other countries, $1.50.



Write for your copy of this new, comprehensive Bulletin 152 describing the complete line of Collyer Portable Power Cables. Collyer Insulated Wire Company, 245 Roosevelt Avenue, Pawtucket, Rhode Island.

New Brunswick Boom *(Continued)*

Boylen group, with $480,000 on hand for the geophysical work in progress on its two properties. Both are in the Bathurst area, one adjoining the Brunswick on the east.

New Jersey Zinc Explorations Ltd.: Holds several groups in the Bathurst area. Has announced no plans for work, but has adequate funds for any undertaken.

New Larder "U" Island Mines: Almost as prominent in the public eye as Brunswick as a promising geophysical and geological prospect. The second company in the Bathurst area to start drilling (Brunswick, of course, was first), New Larder has fine looking aeromagnetic and electromagnetic anomalies to probe. Option on control has been taken by Frobisher Ltd. (Ventures' subsidiary). The New Larder bank account carries a credit balance of $800,000. The stock has been the year's market feature, soaring up from 9¢ to a top near $3.

Noranda Mines: Holds a concession in the Rocky Brook-Millstream area, where a modest copper deposit was outlined in drilling last year. This Spring, 50-50 with Mining Corporation of Canada, staked a big block of claims about 40 mi. west of the Bathurst area.

Norsewick Mines: Has started line cutting for survey purposes on 40 claims in the south section of the Bathurst area. Funds immediately available total $80,000.

North Inca Gold Mines: With $35,000 on hand, North Inca plans to start work quickly on its Bathurst area property adjoining north of St. Joseph Lead's biggest group.

North Trinity Mining Corp.: Is reported to have ground in the southwest section of the Bathurst area.

Nubar Mines: Holds a group on strike of the Brunswick orebody, one group removed, to the south. Geophysical work is under way. The company has $80,000 cash, and recently added 1.5 million shares for additional financing.

Nudulama Mines: The former Ladulama, revamped to raise additional funds with which to explore its two Bathurst area groups, on which surface crews are already at work. Has $1-million net current assets, but wants more. Its original property, an Ontario gold property, will need at least that much for mill installation when work is resumed there.

O'Brien Ltd., M. J.: A private concern (family company of the O'Brien's, of Ottawa) with a big block in the Rocky Brook-Millstream area, and another one recently acquired in the Bathurst section. Has strong finances, and will be working actively on both groups.

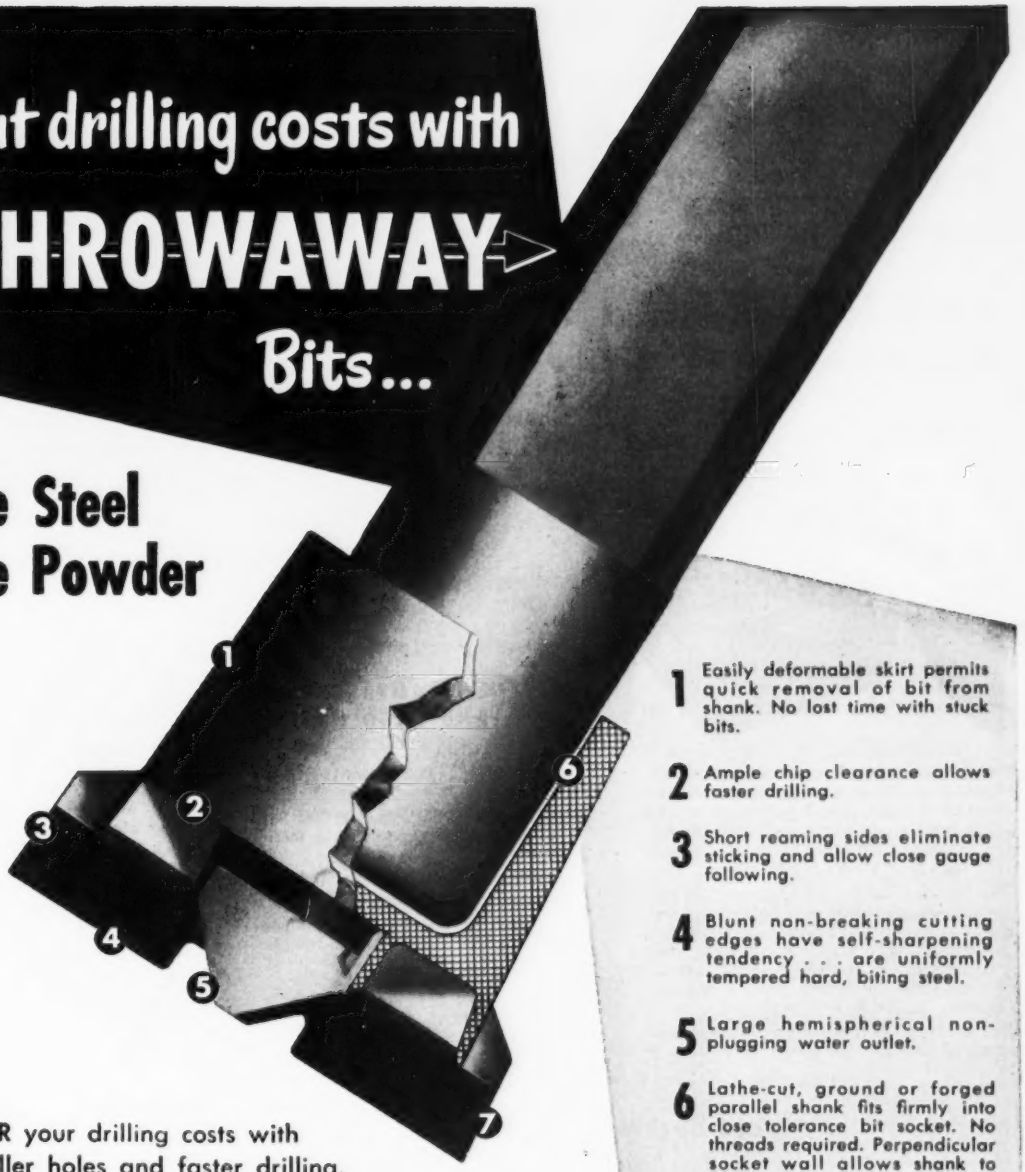
Orlac Mines: Has ground a short distance west of New Larder, and $20,000 with which to start probing it.

Quemartic Mines: Will prospect this summer on 20 claims in the Lake

(Continued on page 208)

Cut drilling costs with THROWAWAY Bits...

Save Steel
Save Powder



1 Easily deformable skirt permits quick removal of bit from shank. No lost time with stuck bits.

2 Ample chip clearance allows faster drilling.

3 Short reaming sides eliminate sticking and allow close gauge following.

4 Blunt non-breaking cutting edges have self-sharpening tendency . . . are uniformly tempered hard, biting steel.

5 Large hemispherical non-plugging water outlet.

6 Lathe-cut, ground or forged parallel shank fits firmly into close tolerance bit socket. No threads required. Perpendicular socket wall allows shank to bottom in bit for maximum performance.

7 Perfect uniformly treated bit teeth assure best possible cutting power and smooth operation.

LOWER your drilling costs with smaller holes and faster drilling. Bottom with 1¼ inch holes and save costly steel and powder. Let us prove to you that the man at the drill can do more work for less cost with a Throwaway Bit. Write for new low price list and technical description of Throwaway Bit to: Portland, Oregon home office or distributors listed below. Competent field engineers and dealers are always at your service.

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BONNE TERRE FARMING & CATTLE CO
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CREATING ENGINEERING
825 1st National Bank Building
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GREENAWALT-WHEELOCK & CO.
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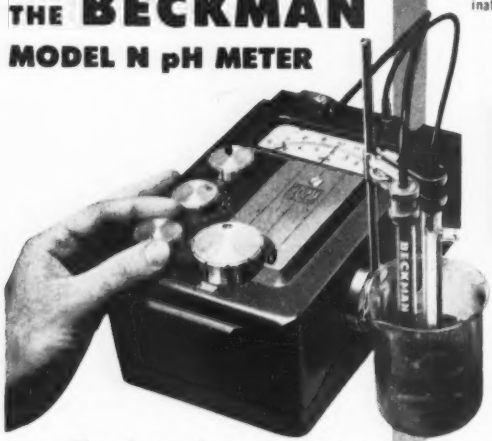
The *Compact*
completely portable way
to make pH savings...

THE **BECKMAN**
MODEL N pH METER



There is scarcely a major industry where Beckman pH control has not provided *new* savings, *new* speed, *new* production advantages. And for those plant and field applications where complete portability is desired, no other instrument equals the Beckman Model N pH Meter.

Light, compact, easy-to-operate, here's an instrument with built-in ruggedness to be used anywhere—in orchards, oilfields, textile mills, mining and mill operations, plating shops, food plants, laboratories—*anywhere*, without dependence on outside power circuits.

Never before have so many important advantages been combined into a single pH instrument...

OPERATING SIMPLICITY AND ACCURACY

- Accuracy to better than 0.05 pH.
- Low operating cost—less than 2c per hour.
- Temperature compensation—0° to 100° C.
- Fast warm-up—less than 10 seconds.
- "Check Pointer" eliminates need for frequent buffer standardization.
- Batteries are easily checked with the regular panel controls—no need to disassemble the instrument. Clip-mounting of batteries eliminates need for soldering or wiring.

NEW COMPACTNESS AND RUGGEDNESS

- All-metal case—cast aluminum with baked enamel finish to resist wear and corrosion.
- Splash-proof design—fully desiccated.
- Shock-proof—tubes individually shock-mounted.
- Light weight—less than 8 lbs., complete.
- Small, compact—only 4" x 6" x 9½" overall.
- Equipped with the new Beckman Red Label Glass Electrode—virtually unbreakable, covers almost the entire pH range, usable from freezing to boiling.
- By far the most rugged overall construction of any pH meter.

See your nearest Beckman dealer for the complete story on Model N advantages. Or write direct for Data File No. 71-27.

Other Beckman pH Meters

For Plug-In Convenience the Beckman Model H is unsurpassed. Operates directly from standard 115 v AC power circuits, and can be left on for continuous operation without rechecking and adjusting. Sloping panel facilitates readings—dual-scale dial permits accuracy to 0.03 pH. Built-in temperature compensation and voltage regulator—many other features!

For Laboratory Accuracy the Beckman Model G provides many special features that insure maximum versatility . . . accuracy within 0.02 pH. Completely shielded electrode compartment accommodates wide range of special-purpose electrodes for various pH determinations as well as titrations, oxidation-reduction measurements, etc.

***Let our trained engineers** study your operations and make recommendations on the pH equipment best suited to your particular needs. No obligation, of course!*

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SOUTH PASADENA 1, CALIFORNIA
Factory Service Branches: Chicago—New York—Los Angeles

Beckman Instruments include: pH Meters and Electrodes — Spectrophotometers — Radioactivity Meters — Special Instruments

New Brunswick Boom *(Continued)*

Nepisiguit area 28 mi. west of the Bathurst area.

Quesabe Mines: Has $60,000 but is being revamped and renamed Brunston Mines to permit further financing with which to explore its 40 claims near the Keymet mine and its 45 claims southwest of the N. A. Timmins property in the Bathurst area.

Randona Quebec Mines: Will have a crew at work shortly on its ground in the mid-section of the Bathurst area.

Red Poplar Gold Mines: Plans geophysical on its 28 claims in the Bathurst area, and has $50,000 with which to finance it.

Roche Long Lac Gold Mines: Has upped its capital from 3.5 to 5 million shares to raise funds for work on its 50 claims adjoining the N. A. Timmins property on the north; already has $95,000 net current assets.

St. Joseph Lead Co: (Operating through subsidiary Leadridge Mining Co.) Was in early and purchased for cash from the staking Boylen Syndicate three of the most attractive Bathurst locations, one of which it shares with Anacon Lead Mines. The latter group, 82 claims, covers one of the area's strongest anomalies; the others, 69 and 174 claims, are locational prospects. An electromagnetic survey is just about completed on the jointly held group, and drilling is getting started.

Teck-Hughes Gold Mines: See Macfie Explorations Ltd.

Timmins Corp. (1938), The N. A.: Also purchased for cash from the Boylen group an important looking anomaly. It's at the south end of the Bathurst area, some 15 mi. from the Brunswick. A large work program (geophysical and drilling) is planned. The company, privately owned by the Timmins interests of Montreal, is strongly financed.

Titanic Mine Holdings: Has a small group west of the Anacon-Leadridge property.

Tumbridge Mines: Holds a large block of claims along the regional fault that features the Meadowbrook area, some 40 mi. west of the Bathurst area.

Uddlen Mines: Has $50,000 with which to finance work on a group that adjoins the Brunswick on the west.

United Montauban Mines: Plans surface work on its group that adjoins New Larder on the south and east.

Violamac Mines: Has property in the southwest section of the Bathurst area, and will possibly do a geophysical this spring.

Wesley Gold Mines: Is raising funds with which to start work on its Bathurst property, northwest of the Brunswick.

Western Tungsten Copper Corp.: Staked 100 claims in the Meadowbrook area. No plans have been announced, but it is expected that work will be carried on during the summer.

Small Stripper finds the Answer

Thompson Coal Company produces 300 yards per day with an International TD-18A stripping and conveyor loading.

Where one tractor has to do the whole job, International's easy handling and high work capacity make a real difference in daily production.

At the Thompson Coal Company, Matoaka, West Virginia, an International TD-18A handles all the tractor work alone.

Here's what Ray Thompson has to say about it:

"This TD-18A has more power than any other tractor its size I've ever used before. We strip overburden, clean around the shovel and feed coal to loading conveyor with it. It has let us step up production considerably. For a small stripper, it's the answer!"

Whether you strip, with a single tractor or a fleet, let your International Industrial Distributor show you how to get more work done per equipment dollar with International power. He has the facts and the figures on the job International "power that pays" can do for you.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

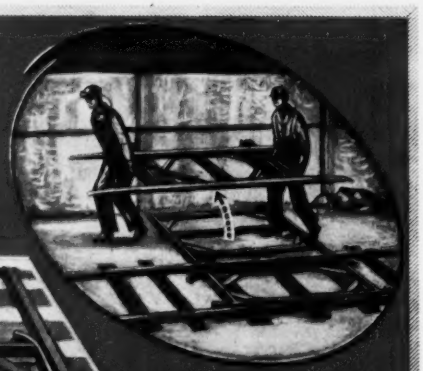
ONE MAN GANG. Thompson's steady-working International TD-18A is shown stock piling to prepare for conveyor loading of trucks. In addition, this handy tractor strips, makes roads and cleans loading area.

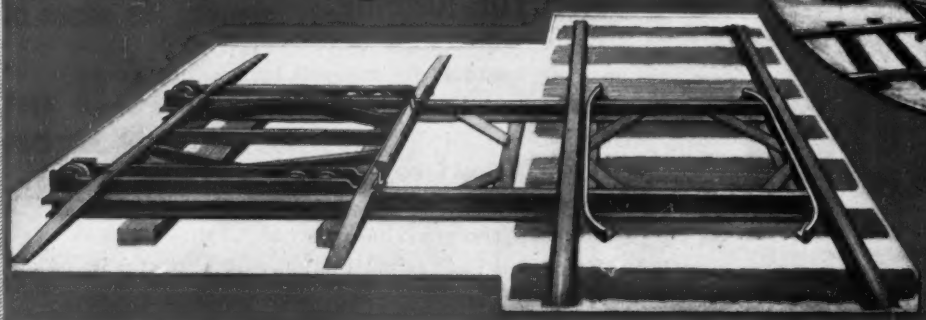
INTERNATIONAL HARVESTER

POWER THAT PAYS

SEE YOU AT THE COAL SHOW! We invite you to the IH exhibit in Lower Lakeside Hall, Cleveland auditorium, May 11 to 14, 1953.

Save Miles of Tunneling with the "Canton Car Transfer." Loads entire train of empties on a single track





Installed at new location in minutes

No need to dig and take out twice the width of a tunnel when a single track will do the job more economically. The "Canton" loads entire train on the single track. This famous economy device can be installed on any track or gauge and rail now in use. Its operation is simplicity itself . . . pushing empty car on track by locomotive then moved by hand to transfer section, permitting locomotive and cars to pass. Train is pulled out all at one time. Two men in two minutes can take down, to move the three units to new location when desired . . . no alterations required for track or rails. Timken Roller Bearings enable easy shunting of heavy cars to maximum weight of six tons. The Car Transfer speeds up loading, hauling, saves expensive double-tracking. Write for complete literature; please use street and zone numbers.

American Mine Door Co.

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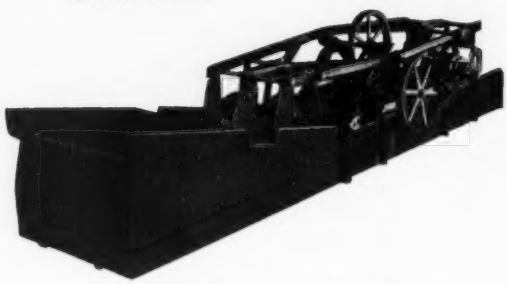
Manufacturers of "Dustributors" • Automatic Switch Throwers • Automatic Mine Doors • Mechanical Track Cleaners

Improve Your Classification with Morse "Trueline" Classifiers

Metallurgical Efficiency

Improved Mechanical Performance



Maximum Pool Area Gives Highest Overflow Efficiency

The improved simplified "Trueline" mechanisms are responsible for the popularity and repeat orders for Morse "Trueline" Classifiers. They are mechanically correct and only minimum head room is required. Maintenance expense is very low—motor drives are compact. For further details, write for Bulletin 407.

Crushing, Grinding, Flotation, Thickening and Filtering Machinery

ESTABLISHED 1898

MB MORSE BROS. MACHINERY CO.

P.O. BOX 1708 • DENVER, COLORADO, U.S.A. • CABLE "MORSE"

EVERY MAJOR ASBESTOS FIBER PRODUCER in North America uses dustube® collectors

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Industry-wide acceptance of a dust collector doesn't just happen—especially so in the asbestos fiber producing industry for controlling its difficult dust problems. Dustube Collectors—the 100% choice of this industry—attained this superiority as a result of its high collecting efficiency, rugged dependable service and low cost operation. Every job was engineered for the application. Dustube engineers, with their many years of practical mining background, cooperated with the mills' engineers to arrive at the most efficient and economical equipment. The extreme flexibility of the Dustube Collector permitted its installation in existing dust sheds or plant facilities. Maintenance costs have been negligible—in fact at one mill tube replacement has averaged only 2% per year!

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Many hitherto "impossible" dust conditions in the mining and metallurgical industry have been controlled with virtually 100% efficiency. Dustube engineers will be glad to show you how your dust and fume problems can be handled with equal efficiency. *Write today for Catalog 72-B.*

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NOW! THE TOUGHEST SHOT FIRING CABLE EVER PRODUCED!

Check the long life qualities offered by this *SUPER DURABLE* **SHOT FIRING CABLE**

- RESISTS SHARP EDGES AND ABRASION
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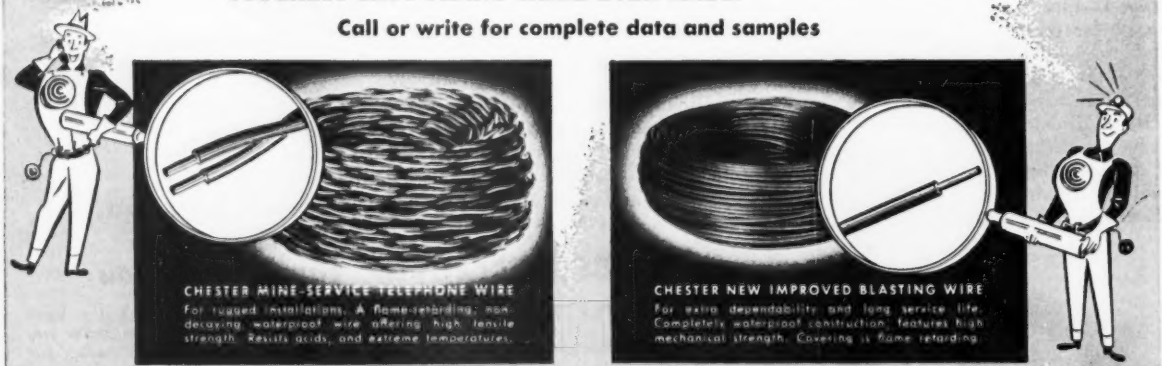
- RESISTS MOST ALKALIS, ACIDS, OILS, GREASES
- IMMUNE TO OZONE AND SUNLIGHT

Exclusive CHESTER nylon jacket over center core increases service life and promotes mine safety

Here's the shot firing cable you can depend on for really tough mine service. It's highly durable when exposed to sunlight and ozone, withstands dragging over sharp edges and abrasives and is highly flexible. Non-cracking over a wide temperature range, Chester is flame retarding and waterproof—the kind of cable that's good for years of usefulness in all types of mining operations. Ask for Chester the next time you order — you'll agree, IT'S THE TOUGHEST SHOT FIRING CABLE EVER MADE!

Call or write for complete data and samples


CHESTER MINE-SERVICE TELEPHONE WIRE
For rugged installations. A flame-retarding, non-decaying, waterproof wire offering high tensile strength. Resists acids, and extreme temperatures.
CHESTER NEW IMPROVED BLASTING WIRE
For extra dependability and long service life. Completely waterproof construction; features high mechanical strength. Covering is flame retarding.

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MANUFACTURERS OF QUALITY WIRES AND CABLES FOR EVERY INDUSTRIAL AND COMMERCIAL APPLICATION

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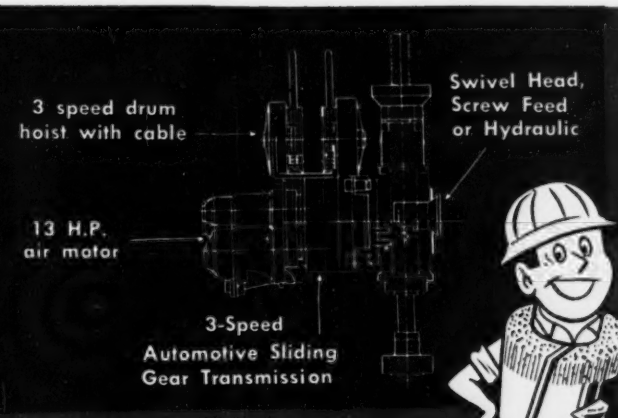
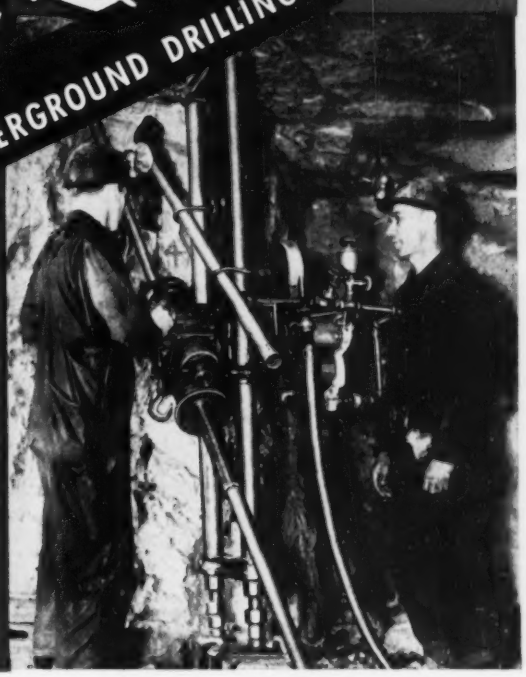
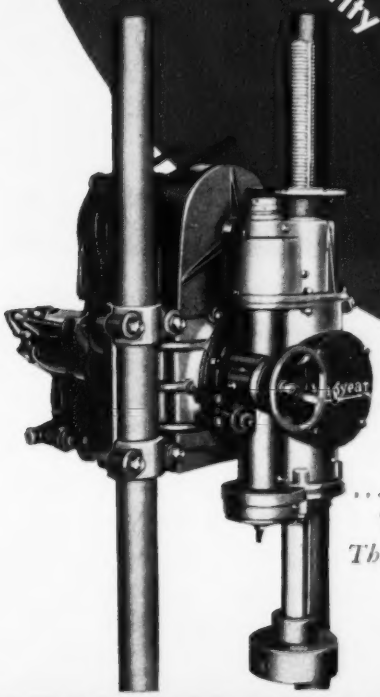
WOLVERINE DIAMOND CORE DRILLS


3 speed drum hoist with cable
Swivel Head, Screw Feed or Hydraulic
13 H.P. air motor
3-Speed Automotive Sliding Gear Transmission

for UNDERGROUND DRILLING

The Choice of Drill Operators for Dependability and Economy.





... Cores Tell The Story

ECONOMY PLUS ADAPTABILITY for underground exploration, either long or short holes, makes the Wolverine highly preferred among the many core drill models manufactured by Longyear. It has abundant power for long holes up to 800 feet in depth. Exceptionally light weight and ease of handling make the Wolverine extremely practical for short core drill holes. The transmission allows a selection of three drilling and three hoisting speeds. The Wolverine, while designed primarily for underground drilling, can be used for drilling from surface where either air or electric power is available.

Write today and let us send you full information and specifications.

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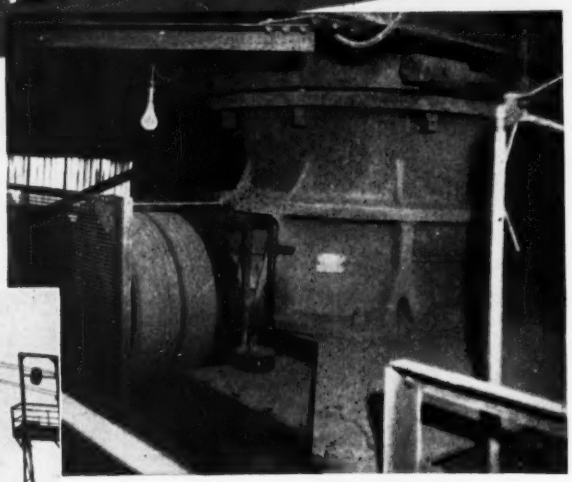
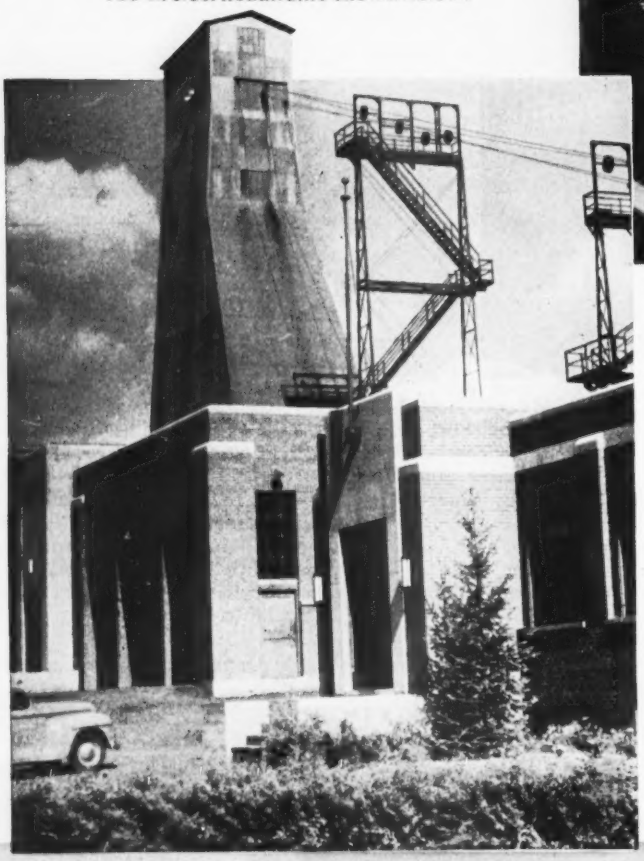
REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

OVER 3,000,000 TONS HAVE BEEN CRUSHED by this TELSMITH



The 13-B Telsmith Gyratory Crusher is located in the upper part of the 135-ft. steel headframe shown below.



• An important iron ore producer in the Iron River district of the Menominee Range in Michigan finds his Telsmith Gyratory Crusher to be exceptionally economical.

Installed in 1942, this Telsmith 13-B Crusher handles about 35,000 tons of ore per month, and to date has crushed over 3,000,000 tons. Crusher upkeep expense has been exceedingly low, consisting of only one set of eccentric bearings and some very minor parts. For details on Telsmith's bigger capacity and lower upkeep, get Bulletin 271.

Min.-34

SMITH ENGINEERING WORKS, 502 EAST CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

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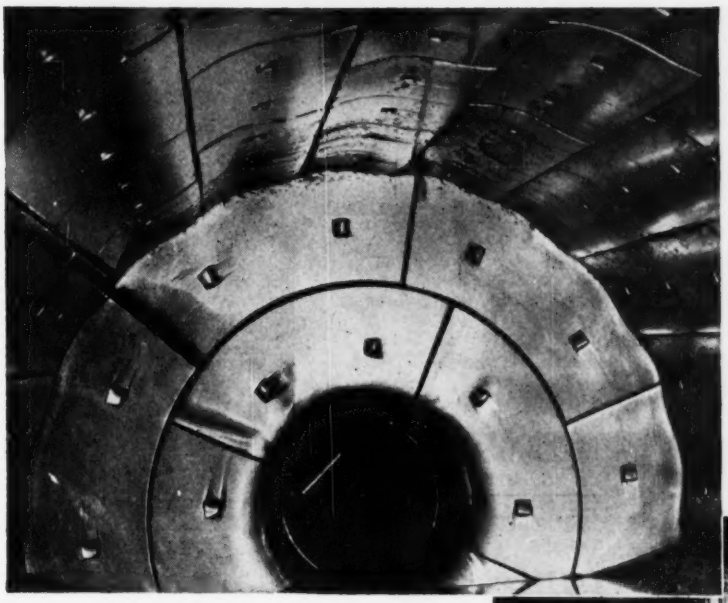
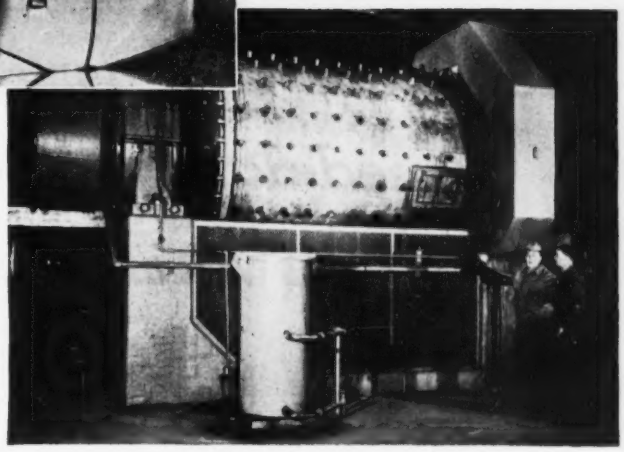
Ontario Eqpt. & Supply Ltd., Toronto, Canada • Mussens Canada Ltd., Montreal, P.Q. • Gordon Russell, Ltd., Vancouver, B. C.



Ni-Hard Liners used in this rod mill are giving characteristic high performance in a leading Adirondack iron ore concentrating plant. These liners were designed for this particular installation and produced by PLATTSBURG FOUNDRY & MACHINE CO., Plattsburg, N. Y. The rod mill...a product of ALLIS-CHALMERS . . . grinds plus 10 mesh feed.



2,500,000 tons of iron ore ground in 3 years show how NI-HARD provides abrasion resistance at lowest ultimate cost

Look at these Ni-Hard® liners and end liners after nearly three years of use...

In an 8 x 12-foot rod mill using 4" rods, handling from 120 to 130 tons of iron ore per hour, they ground approximately 2,500,000 tons.

This moderately priced nickel-chromium iron...with a matrix resembling that of fully hardened steel...is the most abrasion-resistant product of the foundry industry.

Take steps, now, to save labor and cut maintenance as well as operating costs by using Ni-Hard for your equipment parts subject to wear and abrasion. Our wide practical experience, gained over the past 20 years in the Ni-Hard field, is available to help you determine *whether or not* Ni-Hard is the best answer to your particular needs. Send us details of your problems for our suggestions. Write us now.

At the present time, nickel is available for end uses in defense and defense-supporting industries. The remainder of the supply is available for some civilian applications and governmental stockpiling.

INCO

THE INTERNATIONAL NICKEL COMPANY, INC.
Dept. 20, 67 Wall Street, New York 5, N. Y.

Please send me free booklets entitled: "Engineering Properties and Applications of Ni-Hard" and "Buyers' Guide for Ni-Hard Castings."

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Company _____

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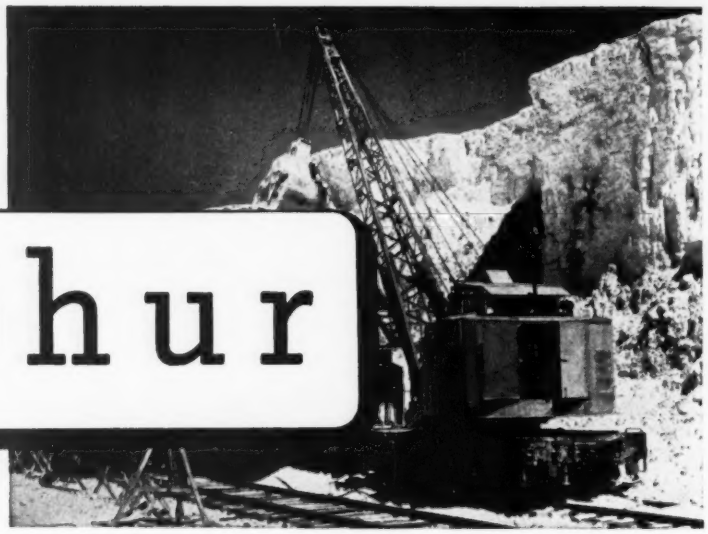


Sulphur

Thousands of tons mined daily, but where does it all go?

Did you ever have the misfortune on a steaming, sticky, sultry day to sit it out on a crowded parkway, bumper to bumper, waiting for traffic to clear? No doubt your thoughts were plenty sulphurous but probably not along the lines we have in mind.

We're thinking of the mineral Sulphur and its link with the automobile. Each car accounts for a substantial poundage of Sulphur, some estimates put it at around 25 pounds for the average car. Give or take 5 pounds, it shows that a tremendous tonnage of Sulphur is needed each year to put cars, buses and trucks on the road ready to operate. And don't forget the tire and battery replacements going on every day.

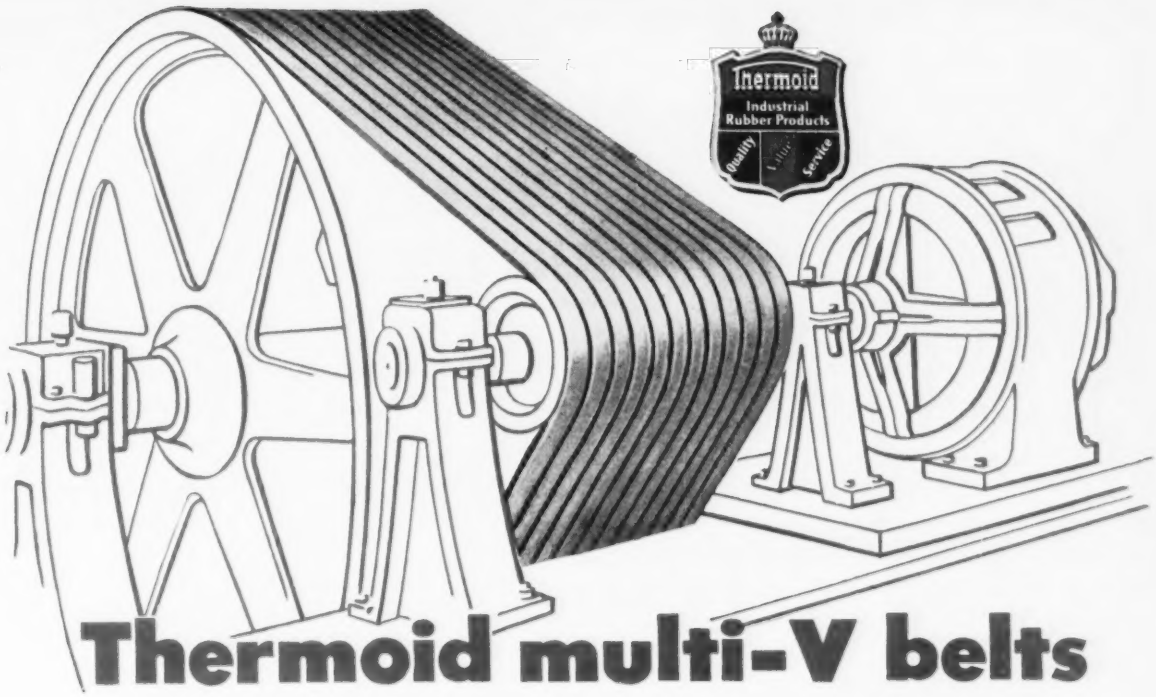
Sulphur enters the automobile picture through the tires, steel sheets, plated and plastic fittings, glass, battery acid and parts, copper tubing and wiring . . . all of which call for the use of Sulphur or its compounds in connection with their manufacture.

Can you wonder that Sulphur goes into industry just about as fast as the sulphur producers of the Gulf Coast Region can get it above ground and cooled preparatory to shipment?

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Sulphur Producing Units: Newgulf, Texas • Moss Bluff, Texas
Spindletop, Texas • Worland, Wyoming



Thermoid multi-V belts

pre-stretched for non-slip performance

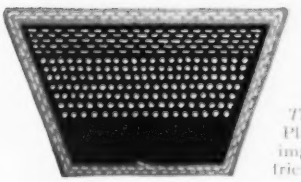
When you use Thermoid *Pre-stretched* Multi-V Belts, you can be sure of maximum power transmission, economical non-slip performance and extra long belt life.

Thermoid Multi-V Belts withstand moisture, abrasion and repeated shock loads.

They're built to take it—specially designed to resist internal friction and heat.

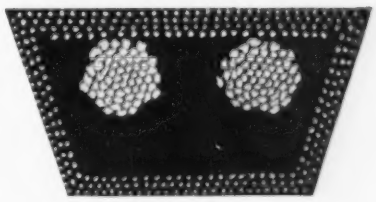
Your Thermoid Distributor can help you with power transmission problems, whether you use Multi-V, F.H.P. or Flat Transmission Belts.

It pays to specify Thermoid.



Thermoid D and E Sections
Grommet type construction assures lower permanent stretch, greater flexing ability and shock absorption.

Thermoid A, B and C Sections
Plied cord construction, latex impregnated to reduce internal friction and heat build up.



•Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

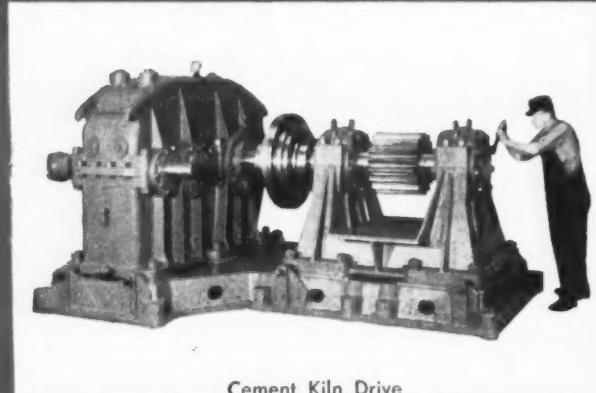
Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

When It Comes to POWER TRANSMISSION On the BIG JOBS

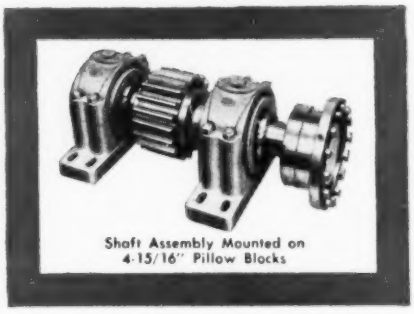
Look to... Jones



Cement Kiln Drive

JONES Products—*While specifically* designed for the heavy industries — *are competitive for all applications.* All the added values of sturdier design, heavier construction and better materials are yours without extra cost.

Ask for Bulletins



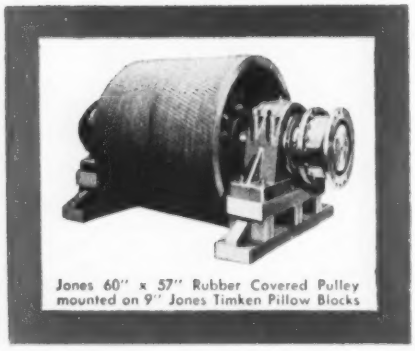
Shaft Assembly Mounted on 4-15/16" Pillow Blocks

SPEED REDUCERS AND COMPLETE DRIVES TO 500 HORSEPOWER

HERRINGBONE WORM GEAR WORM HELICAL

PILLOW BLOCKS to 9" Shaft Size

Timken Equipped, Adaptor Sleeve Type
Self-Aligning, Dust-Tight
Sizes to 4-15/16" in Stock



Jones 60" x 57" Rubber Covered Pulley mounted on 9" Jones Timken Pillow Blocks

CAST IRON CONVEYOR PULLEYS

Tailor-Made to Your Requirements.

CUT GEARS

to Your Specifications

HERRINGBONE - WORM
HELICAL - BEVEL - SPUR

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Since 1890

Jones

In The Service Of Industry

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CAST IRON PULLEYS • CUT GEARS • V-BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • FLEXIBLE COUPLINGS

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COPPER-MOLYBDENUM-ALLOY

Grinding Balls

Used and Proved All Around the World

Measure the price of your grinding balls in terms of highest possible production and the lowest cost per ton of material ground

Do this and you will join the ranks of mines, mills and cement plants, including some of the world's largest concentrators, who have standardized on Moly-Cop balls.

The Sheffield alloy, hot rolled, hot forged, slow cooled, reheated, sized and quenched—all by means of automatically controlled equipment—produces fine-grained, harder, tougher balls that wear longer and hold their spherical shape longer.

You benefit from lower ball costs per ton milled, fewer chargings, less handling and down time, greater grinding efficiency and reduced mill power consumption.

Sheffield engineers stand ready to prove the money savings advantages in your operation.

SHEFFIELD STEEL CORPORATION

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SUBSIDIARY OF ARMCO STEEL CORPORATION

Export Representatives: ARMCO INTERNATIONAL CORPORATION, MIDDLETOWN, OHIO

BUYING A MAGNET? *it's enough to drive a guy nuts!*

YOU'VE GOT A JOB for a magnetic separator. All you have to do is find the right one — and, brother, that can be tough.

That's why the "intangibles" you get when you buy a Dings magnetic separator are so important — the expert advice of Dings field engineers, backed by this firm's 50 years of experience. And the complete facilities of the Dings Laboratories, equipped to run separation tests on every conceivable material.

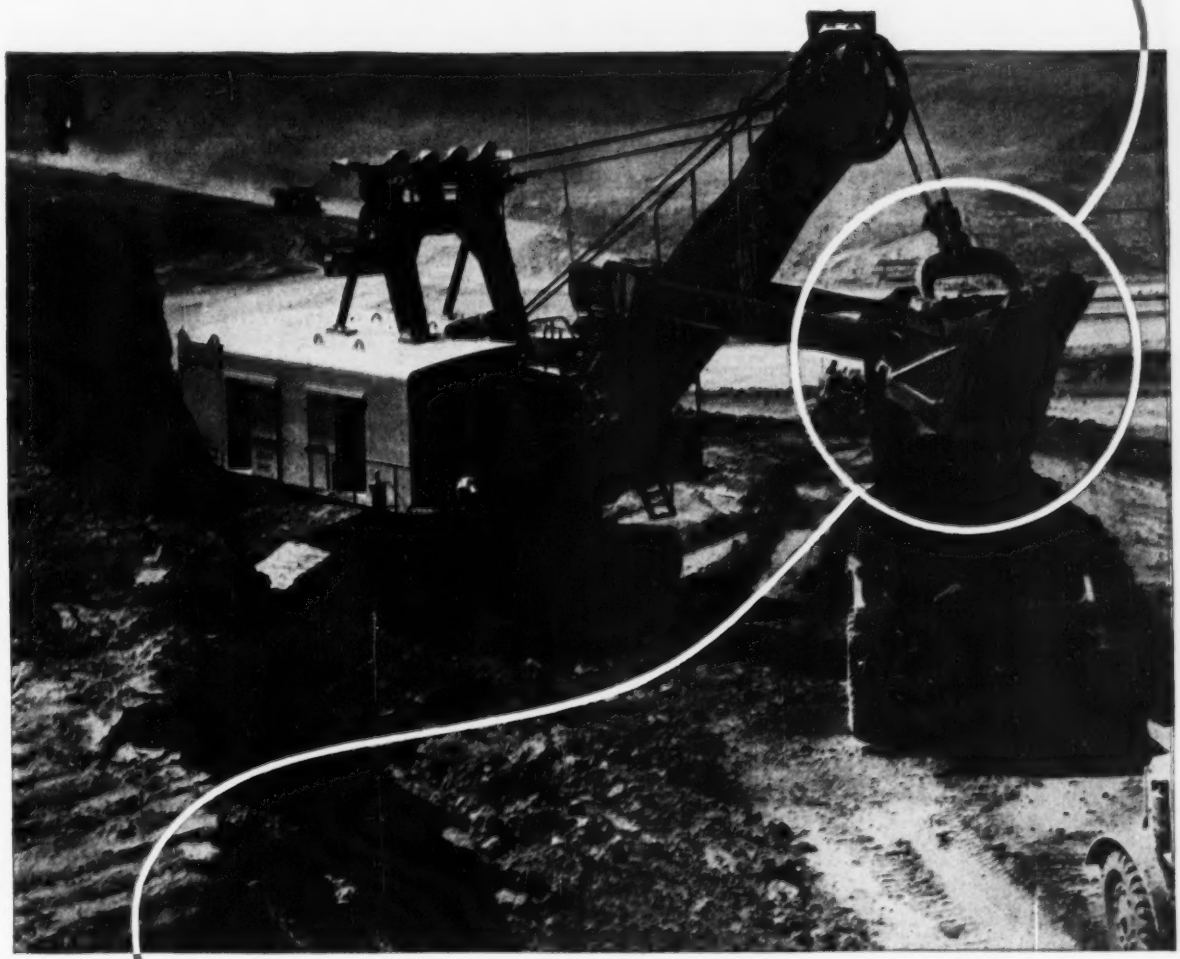
Dings has a complete line of magnets and magnetic separators for purification, concentration, tramp iron removal, scrap separation, reclamation and materials handling. When you have a job for a magnet to do see your representative, or write Dings. And send today for free catalogs B-1600-A and C-5000-B.

Dings EM 153

MAGNETIC SEPARATOR COMPANY

4716 W. ELECTRIC AVE., MILWAUKEE 46, WISCONSIN

IN BIG YARDAGE YOU CAN'T AFFORD TO BE WITHOUT



THE MARION 191-M

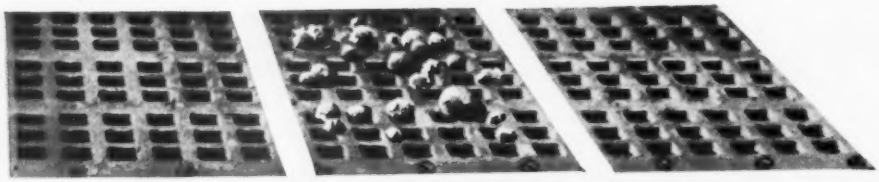
World's Largest Shovel on Two Crawlers
10 Cubic Yards
with small machine cycle speed and maneuverability
Ward-Leonard Electric or Diesel Electric

MARION POWER SHOVEL CO.
MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

from ¾ cu. yd.
to 45 cu. yds.

Before... and... After...



the screen is the same

Hendrick Perforated Metal Plate assures a long life of service on vibrating and shaking screens. Available in any desired shape or size of perforations, it can also be supplied flat or corrugated in proper gauges of regular, high carbon, and high tensile steels and in other commercially rolled metals.

Full open clearance reduces blinding to an absolute minimum. Decks can be changed fast and easily, saving valuable time and labor costs. Write for more information.

SEE OUR CATALOG IN SWEET'S

Hendrick

MANUFACTURING COMPANY

70 DUNDAFF STREET, CARBONDALE, PA.

Sales Offices in Principal Cities

PERFORATED METAL • PERFORATED METAL SCREENS • WEDGE-SLOT SCREENS
ARCHITECTURAL GRILLES • MITCO OPEN STEEL FLOORING • SHURE-SITE TREADS • ARMORGRIDS

Lower per foot drilling costs with

ASCOLITE • NICOLITE • BRONZOLITE

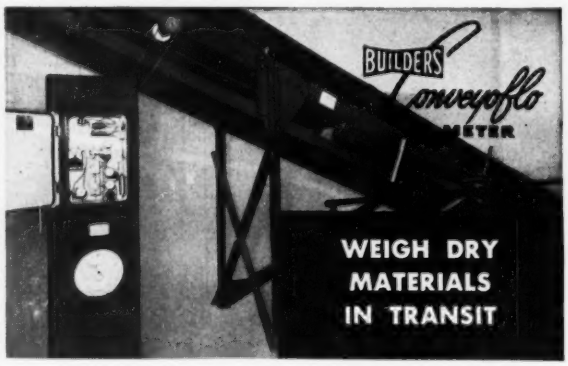
DIAMOND BITS BY

EST. 1908 **ANTON Smit** & CO. INC.

Importers and Dealers • Carbons, Bortz, Ballas
Manufacturers of Diamond Tools

333 W. 52nd St., New York 19, N. Y. Cables: PROFITABLE, New York

Send for catalogs
LICENSEES WANTED.



This precision meter totalizes the weight of dry material passing over conveyor belts continuously, automatically, accurately. Available as a separate, self-contained unit — or for installation in your present conveyor lines.

EXCLUSIVE FEATURES:

- Accurate . . . within ± ½ of 1% of actual weight from maximum to 50% of rated capacity; within 1% from 50% to 25% rate; within 2% from 25% to 10% of meter's rated capacity.
- Automatic totalizer compensation for variations in belt speed and changes in belt weight.
- Responds accurately to rapid load variations.
- Paces auxiliary equipment (feeders, controllers, continuous blending processes, etc.) and operates secondary instruments.

Write for Bulletin 550-H4, giving complete details. Builders-Providence, Inc. (Division of B-I-F Industries), 391 Harris Ave., Providence 1, R. I.

B-I-F INDUSTRIES **BUILDERS-PROVIDENCE** BUILDERS

OFF THE ROAD

GENERALS

ON THE ROAD

Resist cuts, scrapes, bruises... Give more traction! More speed! More safety—

WORK FASTER... LAST LONGER... COST LESS

more profit for you per job!

GENERAL L. C. M. Broad, deep, self-cleaning tread lugs and reinforced shoulders for more traction off-the-road. Longer wear on razor sharp mine and quarry surfaces.

GENERAL H. C. T. for most work on-the-road, some off. More rubber, more cords per inch for greater safety. Extra traction through sand, gravel, slush, mud.

THE GENERAL *L.C.M.*

THE GENERAL *H.C.T.*

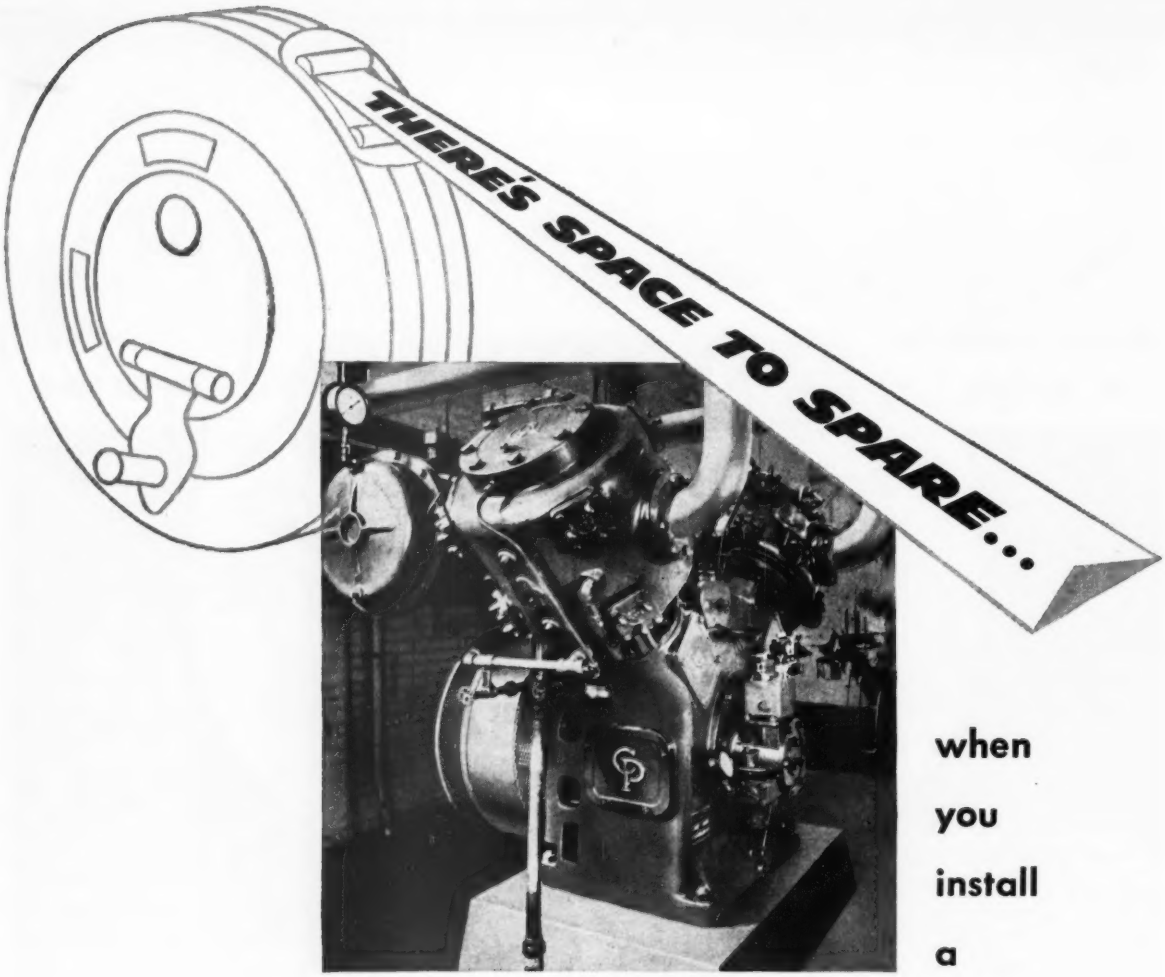
Make Every Worn Tire Work Longer for More Profit!

Your GENERAL TIRE DEALER will KRAFT SYSTEM RECAP Worn Tires with the New GENERAL Truck Tire Tread of Your Choice

KRAFT SYSTEM RECAPPING
A GENERAL TIRE SERVICE

You're throwing away money when you throw away worn tires or accept an ordinary "adjustment" for them. Let your General Tire Dealer—a tire expert—restore worn tires with famous factory controlled Kraft System Recapping. You choose from the complete line of on and off-the-road new General Tire treads and he'll put that tread on your worn tire. He can do sectional repairs too. Get Kraft System Recapping—get more profit from every tire.

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT



when you install a

TYPE Y

compressor

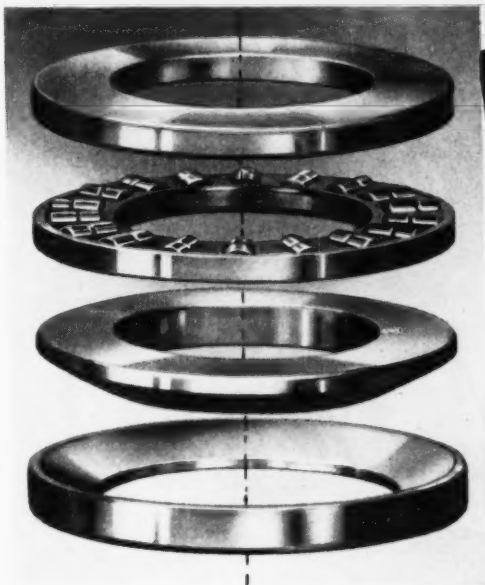
Chicago Pneumatic's compact, heavy-duty Type Y Compressor is ideal where space is limited. It takes up minimum floor area, but is designed for continuous heavy service. Shipped as a complete "package" ready for easy installation, it requires the simplest of foundations – needs no alignment.

The highly efficient Type Y Compressor has roller main bearings, precision connecting rod bearings, multi-step capacity regulation, and an easy-to-clean shell-and-tube intercooler.

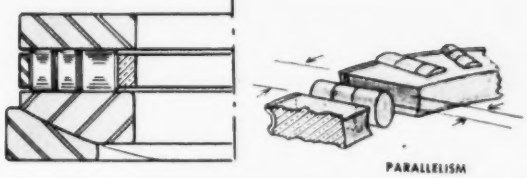
Available in sizes from 75 hp to 250 hp, 410 cfm to 1663 cfm, and with flange mounted, belted and coupled motors. Write for Bulletin 766. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

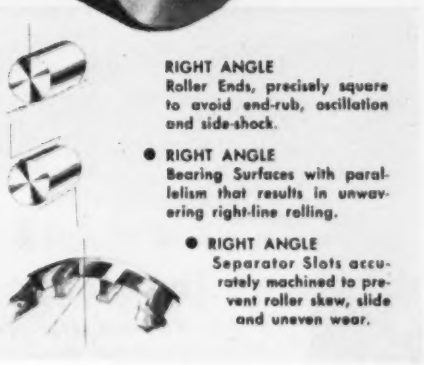
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



THRUST
RADIAL



ACCURATE PARALLELISM between the rollers and the matched thrust plates is repeated in the parallelism between the separator slots and the rollers themselves—all adding up to quietness, equalized wear and longer life.



RIGHT ANGLE
Roller Ends, precisely square to avoid end-rub, oscillation and side-shock.

- **RIGHT ANGLE**
Bearing Surfaces with parallelism that results in unwavering right-line rolling.

- **RIGHT ANGLE**
Separator Slots accurately machined to prevent roller skew, slide and uneven wear.

Held to extremely close limits of parallelism, every roller—every race—every thrust plate in a Rollway Bearing is an engineering masterpiece of matched precision and right-angle trueness. As a result, friction losses are low—load capacity and service life high.

Rollway Radial and Thrust Bearings offer the widest selection in types and sizes, available for quick replacement through authorized distributors. Consult your classified phone directory under BEARINGS.

Our engineers are available without cost or obligation to assist you in selecting the correct Rollway Bearing for your needs. Call your nearest Rollway sales office.

SALES OFFICES

Syracuse	Houston
Cleveland	Chicago
Detroit	Philadelphia
Boston	Toronto
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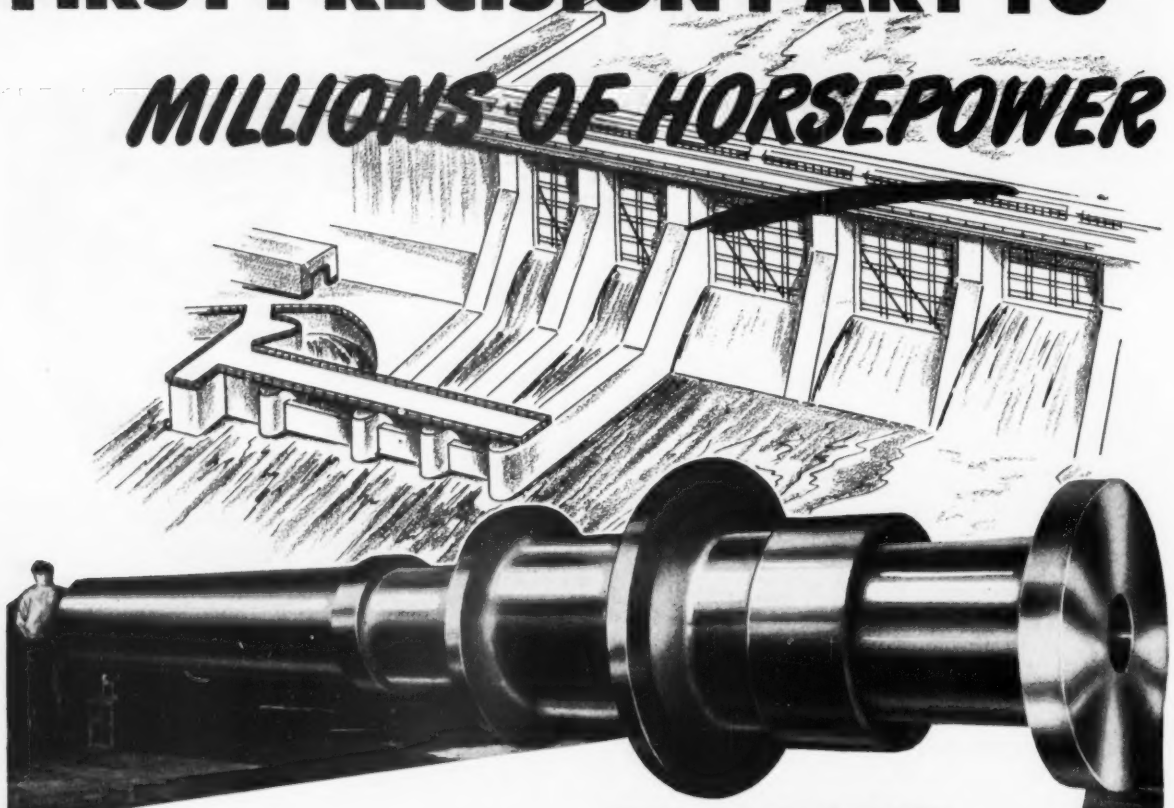
ROLLWAY
BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings

FIRST PRECISION PART TO MILLIONS OF HORSEPOWER



MIDVALE CRAFTSMEN PRODUCE GIANT TURBO GENERATOR SHAFT

The heart of the power conversion to electricity in America's dams is the huge shafts that carries the turbine blades and other essential parts. On its precision and long life depends millions of horsepower for homes, plants and factories of our country.

That is why Midvale craftsmen are called upon to produce huge turbo generator shafts similar to the one shown above — over thirty-four feet in length, ninety-six inches in diameter and machined to specifications.

Midvale precision and performance can supply all your needs for heavy equipment in industry. Pressure vessels for the petroleum and chemical industries . . . rolls for the paper and steel industry . . . rings for turbines and gears . . . forgings and heat and corrosion castings for all industries. If the job is big and the specifications exacting, you need the services of Midvale engineers and craftsmen.

THE MIDVALE COMPANY
NICETOWN, PHILADELPHIA 40, PENNA.
OFFICES: NEW YORK • CHICAGO • PITTSBURGH
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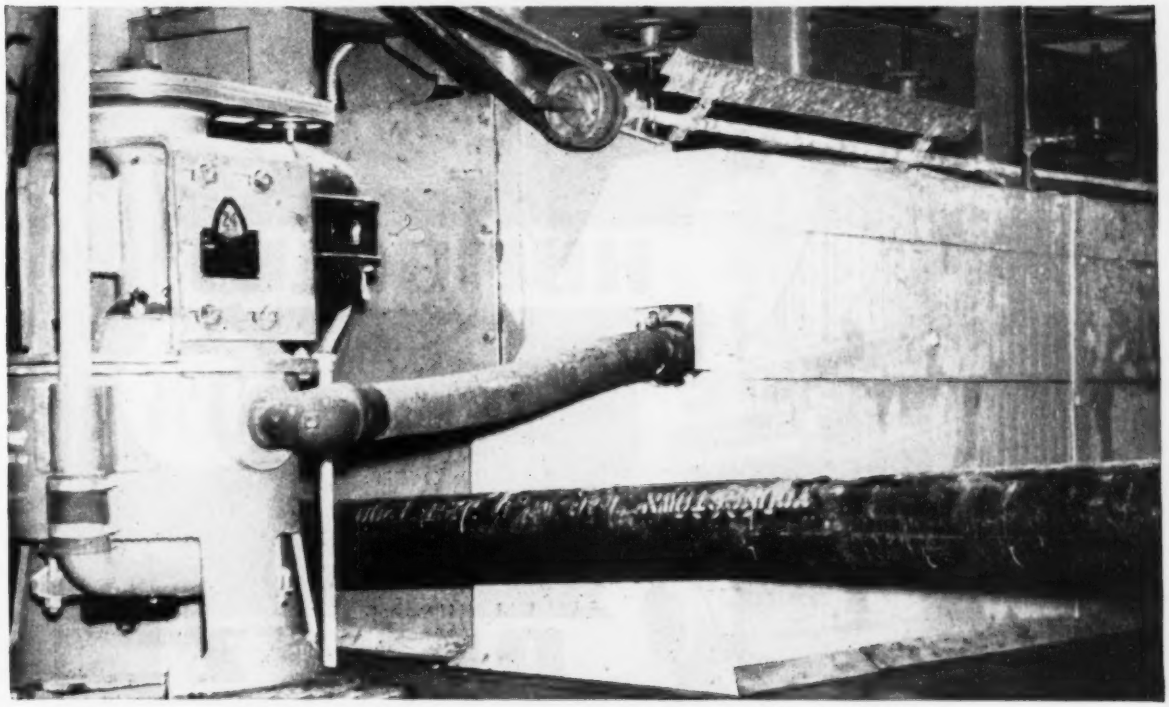
MIDVALE

Custom Steel Makers to Industry

PRODUCERS OF FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS

DENVER VERTICAL SAND PUMPS

Complete Milling Equipment – from testing, to feeder, to dryer!



The 2" Denver Vertical Sand Pump pictured above is handling flotation froth direct from the launder—without a sump and with minimum spray water.

You Can Easily Handle Abrasive And Frothy Pulps With A Denver Vertical Centrifugal Sand Pump

Increase your production and eliminate expensive pump trouble with Denver Vertical Sand Pumps for your difficult pulp handling.

These Denver Vertical Pumps easily handle flotation concentrates, middlings or other frothy pulps...granular gravity concentrates and fluctuating middling flows. In fact, the Denver Vertical Sand Pumps will handle any —¼" feed that will flow by gravity.

NO PACKING GLAND

The Denver Vertical Sand Pump design eliminates the trouble spots found in most sand pumps. One of these engineered features is the elimination of any packing gland or sealing water.

Since the feed pulp flows by gravity into the pump bowl and through to the feed opening on the top of the runner, there is no need for troublesome packing around the shaft. The large cast iron pump bowl also serves as a feed chamber, eliminating a sump or feed box.

HANDLES FROTHY PULPS

A vortex is created in the feed bowl by the action of the runner in the bottom. This vortex action also prevents stalling or plugging from pulps containing sands or coarse materials.

SELF-PRIMING, NON SURGING

With the feed bowl over the runner, no priming is necessary as any feed to the pump flows by gravity into the runner intake opening.

The Denver vertical design places the runner case in a horizontal plane and makes it impossible for the surging common to ordinary sand pumps when operated below capacity or on intermittent or fluctuating feed flows.

Sizes: ¾" to 4", capacities to 400 g.p.m. @ 25% solids. Many sizes are in stock.

Write or wire today, find out how a Denver Vertical Sand Pump will reduce operating and maintenance costs and give you dependable pumping service.

Free Technical Bulletin Sent On Request

Over 25 years of Flotation Engineering

DENVER EQUIPMENT COMPANY

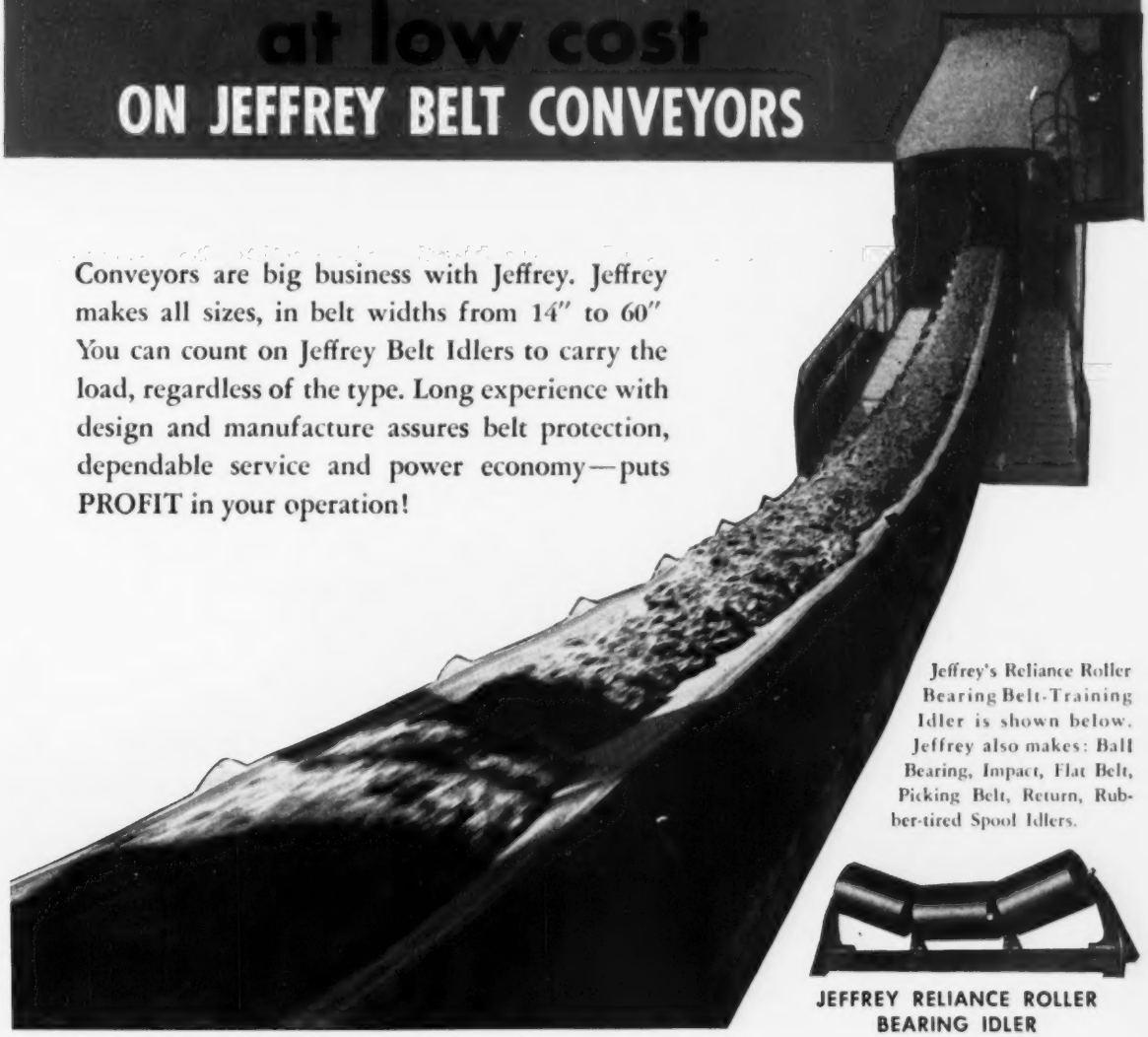
1400 SEVENTEENTH ST. DENVER 17, COLORADO

HUMBOLDT
Since 1856
Mines Equipment, Mineral Dressing Plants, Crushing and Grinding Machinery, Cement Mill Outfit, Metallurgical Works, Coal Preparation Plants, Steel Constructions for Buildings and Bridges.
DEUTZ
Since 1864
Otto-, Gas-, Diesel-Engines for Every Purpose of Two- and Four-Stroke design, Output range 3 - 1500 H.P. Cooled by water or air, Diesel-powered tractors, Diesel locomotives, Gas producer plants
MAGIRUS
Since 1864
Trucks and busses driven by air-cooled DEUTZ Diesel engines, Vehicles for municipal services, Fire ladders, fire engines, Fire fighting water trucks, Two-wheeled ladders, Fire fighting equipment.
KLÖCKNER-HUMBOLDT-DEUTZ AG · KÖLN U. ULM

Send inquiries to either Köln, Germany or Ulm, Germany

ORE MOVES FAST at low cost ON JEFFREY BELT CONVEYORS

Conveyors are big business with Jeffrey. Jeffrey makes all sizes, in belt widths from 14" to 60" You can count on Jeffrey Belt Idlers to carry the load, regardless of the type. Long experience with design and manufacture assures belt protection, dependable service and power economy—puts PROFIT in your operation!



Jeffrey's Reliance Roller Bearing Belt-Training Idler is shown below. Jeffrey also makes: Ball Bearing, Impact, Flat Belt, Picking Belt, Return, Rubber-tired Spool Idlers.

JEFFREY RELIANCE ROLLER BEARING IDLER

Jeffrey specializes in modern material handling: Jeffrey engineers will help you determine the conveyor system best suited to your capacity and cost requirements. Belt Stackers—Bucket Elevators—Apron, Belt, Chain and Screw Conveyors—Car Pullers—Chains—Crushers—Vibrating Dryers, Feeders, Grizzlies and Conveyors—Idlers—Pulverizers—Magnetic Separators—Transmission Machinery.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!

"He Might Need It..."

"He never was much for letter-writing when he was in college. But he must know how anxious Mother and I are . . . now that he's off in Korea. Haven't heard from him in six weeks. Of course, they say 'no news is good news' . . . but I wonder. Maybe he can't write . . . because . . . maybe he's in a hospital somewhere. And maybe he needs blood. I don't know . . . but I'm not taking any chances. That's why *I'm* giving blood."

★ ★ ★

Yes, all kinds of people give blood —for all kinds of reasons. But whatever *your* reason, this you can be sure of: Whether your blood goes to a combat area, a local hospital, or for Civil Defense needs— this priceless, painless gift will some day save an American life!

Give Blood Now

CALL YOUR RED CROSS TODAY!

NATIONAL BLOOD PROGRAM

Business Executives!

✓Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Has your company given any recognition to donors?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of cooperation?
- ☐ Was information given through Plant Bulletin or House Magazine?
- ☐ Have you conducted a Donor Pledge Campaign in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

5 reasons why modern mines buy Willison Automatic Couplers

1 SAFE

Willison Automatic Couplers require no manual assistance . . . no need for men to go in between cars to couple or uncouple a Willison Automatic!

2 FAST

All Willison couplers have the same contour . . . can be coupled at either end of car or locomotive . . . no time-consuming reversing is necessary.

3 STABLE

Close coupling of Willison couplers eliminates damaging slack . . . permits higher speeds with maximum stability . . . reduces surging and spilling.

4 PROTECTIVE

Two parts, the head and the lock, do all the work on every Willison coupler . . . take the shocks and strains to protect cars and locomotives from damage.

5 PROVED

Over 50,000 Willisons speed handling and cut costs in mines and industrial plants everywhere. Why not specify Willison Automatic Couplers for your haulage needs?

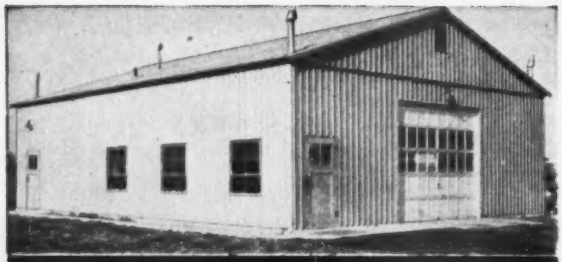
WRITE TODAY for Folder 5452 for more information on Willison Automatic Couplers. National Malleable and Steel Castings Company, Cleveland 6, Ohio.

A-3545

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY Est. 1868

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

WILLISON AUTOMATIC COUPLERS • NACO STEEL WHEELS • NACO STEEL LINKS and SWIVEL HITCHINGS



COLUMBIAN ALL-METAL BUILDINGS

Strong • Fire-Safe • Low Upkeep

Columbian All-Metal Buildings are increasingly popular with the mining industry because of their unlimited utility value—for warehouses, engine houses, dryhouses, shops, garages, compressor houses, etc. Prefabricated from quality steel. Sectional construction assures easy, low-cost erection. Exceptionally weather-tight. Rigid, strong, fire-safe. Minimum upkeep. Order from distributors listed below—or write direct for complete information.

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P. O. Box 4048-D, Kansas City, Mo.

Distributors in the United States

Denver Equipment Company
1400 Seventeenth Street
Denver, Colorado

Eimco Corporation
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Salt Lake City, Utah

Distributors—Foreign

Avenida Ejercito Nacional 458-D Colonia Chapultepec Morales
Mexico, D.F.

DO YOU HAVE A HOPPER FEEDING PROBLEM? HERE'S THE ANSWER...

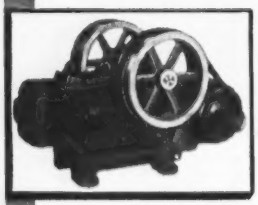
Rugged, effective vibration without damage to your bins and hoppers when you use the patented Peterson pneumatic VIBROLATOR.

Effective, all-directional vibration for moving stubborn materials toward hopper outlets. And when attached to concrete forms or molds, the VIBROLATOR will eliminate voids and give a smooth surface. Whatever your vibrator requirements, there's a Peterson VIBROLATOR to fit the job and do it more efficiently.

WRITE for complete description, installation data and sizes—

MARTIN ENGINEERING COMPANY
KEWANEE 4, ILLINOIS

FOR FAST, UNIFORM ORE SAMPLE PREPARATION



DFC CRUSHERS

Designed to reduce the hardest rock 2½" to 2". Ruggedly built for long-life. Available in two sizes with flat or V-belt motor drive. Pitman-toggle movement and reversible jaws insure efficient operation with a minimum of maintenance.

DFC PULVERIZERS

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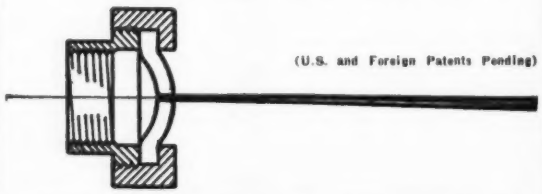

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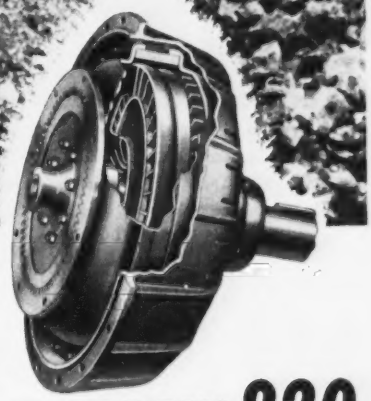

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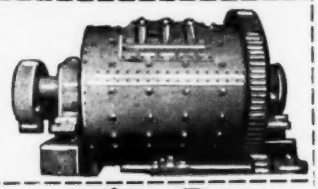

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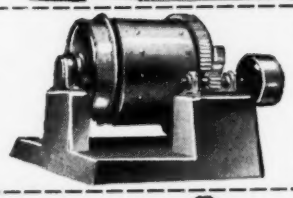

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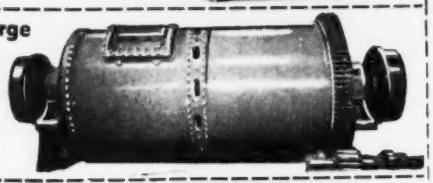

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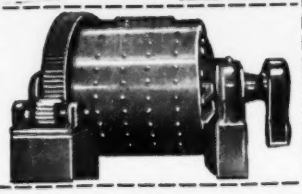

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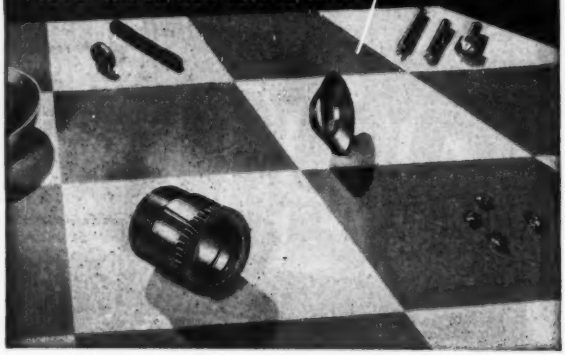

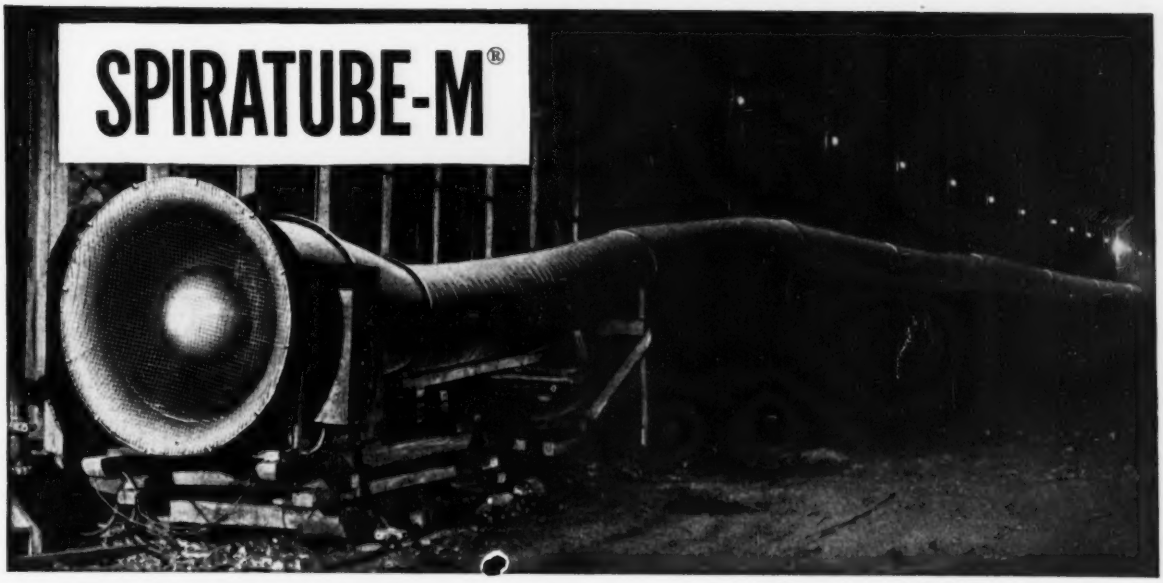

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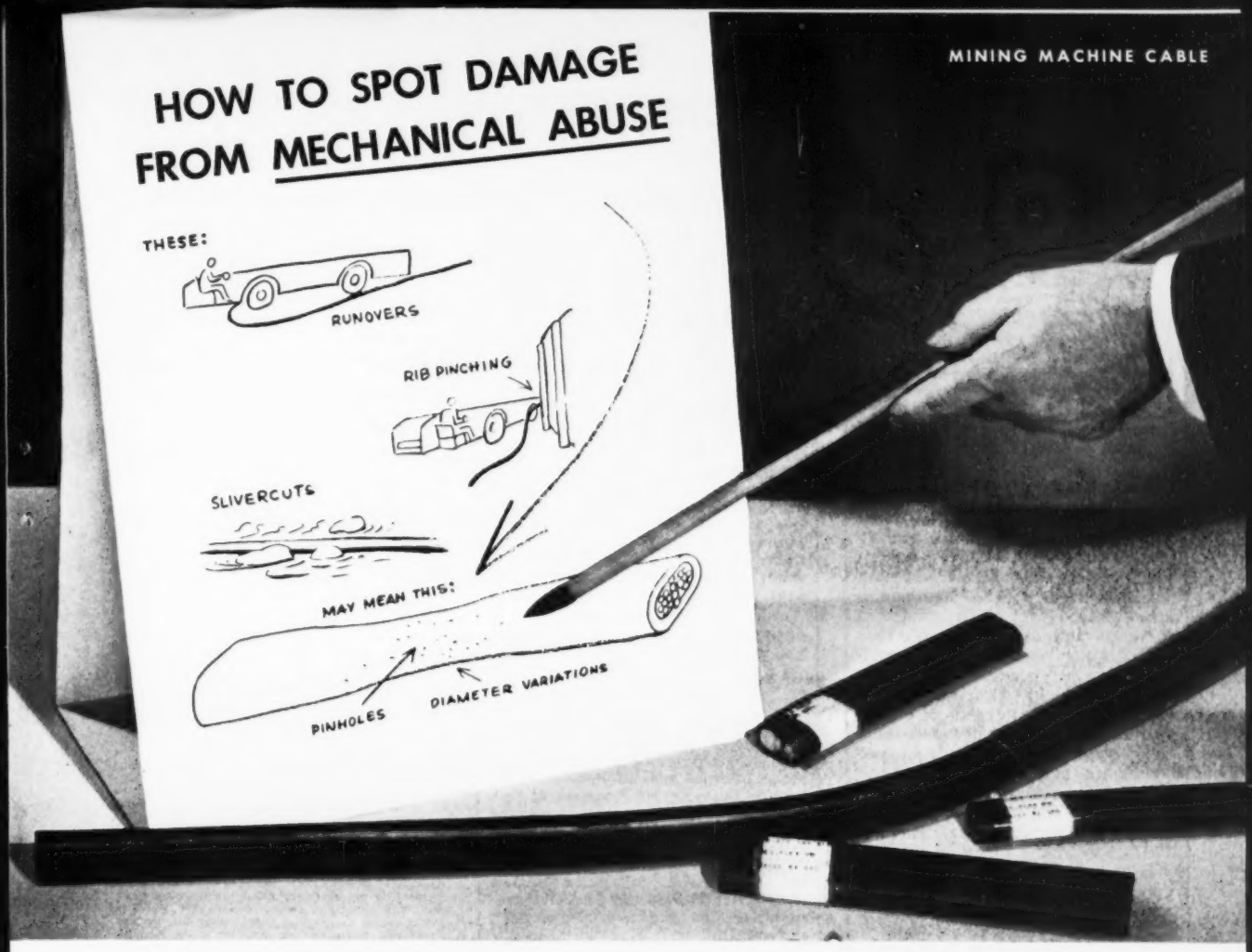

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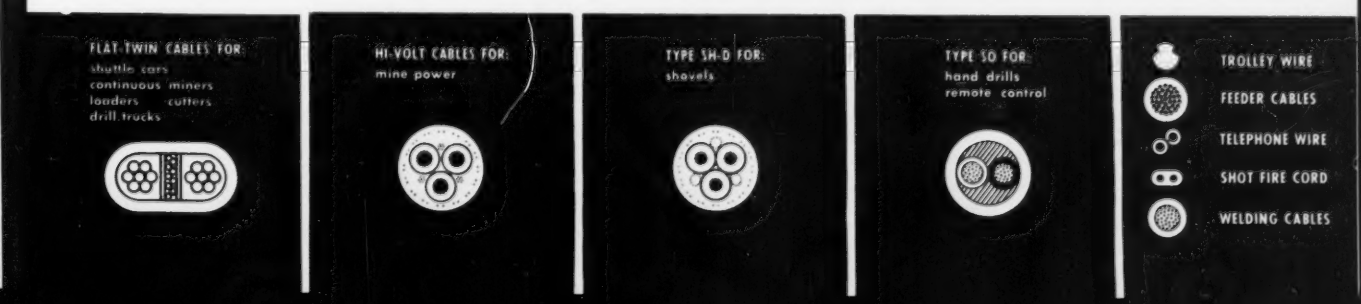

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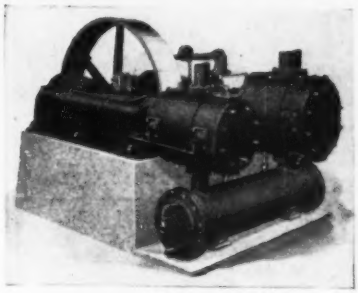

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1	3000	Whse.	80	4800/2400	720
2	2100	G.E.	100	2300	360
2	1750	G.E.	100	2300	3600
1	750	G.E.	80	2300	450
1	600	G.E.	100	440	360
1	700	G.E.	80	2300	720
1	250	G.E.	100	2300	514
1	200	Whse.	80	440	1200
1	187	G.E.	80	440	720
1	150	G.E.	100	2200	900
1	150	G.E.	100	550	600
1	120	G.E.	80	550	450
3	135	G.E.	80	4000/2200	1200
3	125	El. Mchy.	100	4800/2400	900
1	125	G.E.	80	2200	900
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Qu.	H.P.	Make	Type	Volts	R.P.M.
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1	400	G.E.	I-K	2200	514
1	400	G.E.	KT-412	2200	450
1	300	Whse.	CS-890	2300	1780
1	200	Whse.	CS-873-C	2200	1200
1	200	Al.Ch.	ARY	440	600
2	125	Al.Ch.	AR	2200	1750
1	125	Al.Ch.	AR	2300	514
1	125	C.W.	126-Q	440	430
2	100	Whse.	CS-663-C	440	1750
1	100	Al Ch.	AR	550	720
1	100	Whse.	CS-938	2200	514
1	100	F.M.	H-241	440	450
2	75	Al.Ch.	AR	2200	1705
1	78	G.E.	I-K	440	600
1	75	Al.Ch.	AR	2200	720

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2	1500	G.E.	600	600	4150/2300
3	1000	Whse.	514	600	11000/6600
4	1000	G.E.	514	600	11000/6600
1	1000	G.E.	514	600	2300
2	500	C.W.	720	575	2300/440
1	400	C.W.	1200	125/250	440/2300
2	250	Whse.	1200	125/250	2300
1	200	Ridgway	900	275	2300
2	200	Whse.	1200	125/250	440
1	155	G.E.	720	250	2300/440
2	150	Whse.	1200	250	2300
1	100	Al. Ch.	1200	125/250	4000/2300
1	100	Delco	1200	125/250	440/220
1	100	Ridgway	1200	275	4000/2300
1	100	C.W.	1200	125	440/220
1	85	C.W.	1200	250	440/220
1	75	Al. Ch	900	250	2300
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1	2750	G.E.	H	3	13,800-2400/4160Y
3	250	Packard	A	1	13,200-2200
3	150	Packard	A	1	2300-230/460
3	100	G.E.	H	1	33,000-2300
3	25	G.E	H	1	2400-120/240
40(new)	3	Al. Ch.	OISC	1	2400-120/240

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1	1200	G.E.	MT 26	2200	277
2	1000	Al.Ch.	ANY	2200	235
1	800	G.E.	MT	2200	440
1	700	Whse.	CW	2300	720
1	600	G.E.	MT 20	2300	360
1	500	Al.Ch.	ANY	2200	514
2	500	G.E.	I-16-M	2300	450
1	400	G.E.	MT 412	2200	440
1	250	Whse.	CW 937	440	1200
1	250	Al.Ch.	ANY	440	720
1	250	G.E.	MT 414	2200	300
1	125	Whse.	CW 870	2200	900
1	100	Whse.	CW 766	440	1200
1	100	F.M.	H 20 C	440	900
2	100	G.E.	I-15A-M	2300	514

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Qu.	H.P.	Make	Type	R.P.M.
1***	3000	Whse.	Encl. (Rev.)	600
1***	2400	Whse.	Encl. (Rev.)	600
4***	1500	Whse.	Encl. (Rev.)	600
4***	1200	Whse.	Encl. (Rev.)	600
4***	800	Whse.	Encl. (Rev.)	600
1	350	G.E.	CD-169-A	1150
1	200/250	El. Dy.	No. 22	400/1200
1	250	G.E.	MPC	325/975
1***	200	G.E.	MPC	500/1200
1	200	Whse.	Mill	300/1200
1	180	G.E.	MPC	400
1***	125	Whse.	SK-190	600
2	125	Whse.	SK-184	575/850
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10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

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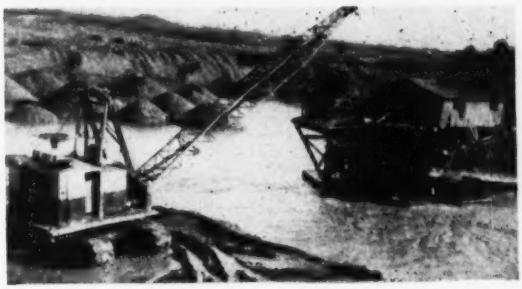

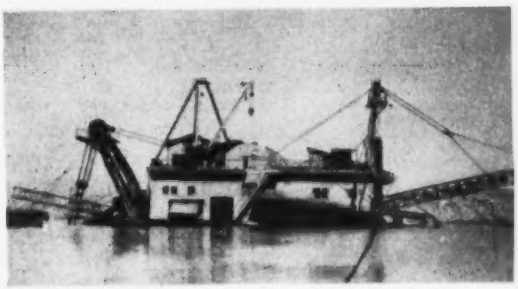
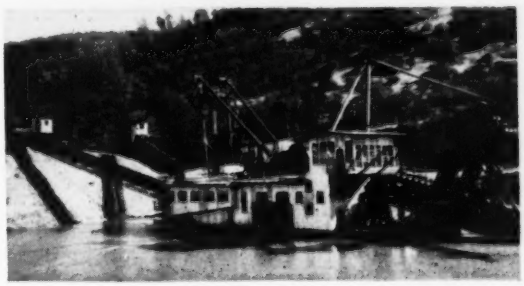
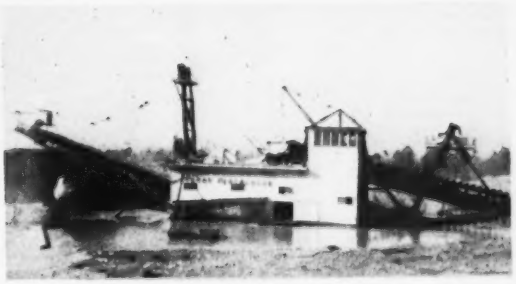

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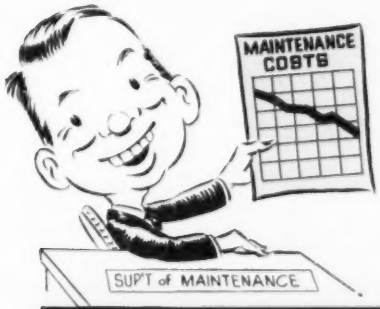

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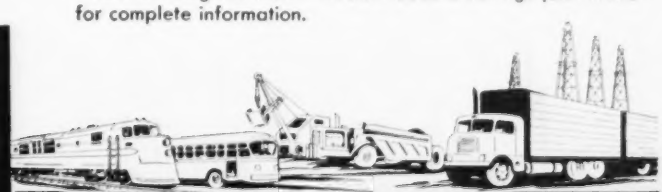

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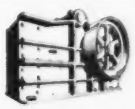
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